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CLASSIFICATION OF THE BANANAS.

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III. Critical Notes on Species.

r. **Musa borneensis** *Beccari*, Nelle Foreste di Borneo, 622 (1902).

The original description, with the Italian notes translated, runs :

Truncus cylindricus, stoloniferus (?) ; petiolus longiusculus ad basin dilatatus ibique ad margines undulatus et crispatus ; inflorescentia pendula ; bracteae late-ovatae, obtusae, flores 5–8 uniseriates obtegentes ; flores masculi 7 cent. longi, in apicem 3-dentatum regulariter attenuati, lobis lateralibus tenuissime cuspidatis, tepalum liberum (floris ♂) perigonio 1/4 brevius, angustum, acutum, leviter ventricosum, marginibus membranaceis involutis ; bacca majuscula, incurva, subcylindrica vel obtusissime costulata, basi breviter crasseque stipitata, apice abrupte, late, breviter obtuseque apiculata ; semina majuscula, obpyriformia, in dimidia superiore parte scabrido tuberculata.

Habitat Sarawak at Marop (P.B. n. 3356).

Plant similar in appearance and size to a common banana. Leaf-stalks arcuate-spreading ; margins of the sheaths glabrous, auriculate, clasping and corrugate. Bunch large, unilateral, pendent. Male flowers uniseriate, 5–8 to each bract, white, greenish at the tip ; bracts rose-vinous, reflexed, revolute at the apex. Perigonium (closed), two-keeled, open above, semi-clasping ; compound tepal provided at the tip with three spreading teeth, later reflexed, green, triangular, the middle one obtuse, the lateral ones terminated by a long filiform point ; free tepal cymbiform, slightly inflated, acute at the apex ; stamens included in the perigonium ; pollen extruded unitedly in a viscosity at the mouth of the perigonium. Fruit glabrous, uniseriate, 14–16 cm. long and 3·5 cm. thick ; seed obpyriform, rather large, about 1 cm. long and 7 mm. wide, tuberculate roughish in the upper half.

This description is illustrated by a photograph of the fruit and a line drawing of the male flowers.

We received seeds at I.C.T.A. in 1931 (Introduction no. 118) from the Director of Agriculture, Sarawak, with the label " Pisang Kra ", from which we succeeded in raising a single plant which is somewhat delicate under our conditions but has been kept alive as a clone and flowered

several times. This plant fits Beccari's commendably detailed description and figures so closely that I have no hesitation in identifying it as *M. borneensis*, though it is not often that a *Musa* can be confidently determined from description alone.

Our observations permit the addition of some details to the description : The plant is stoloniferous, though stooling rather sparsely under our conditions. Its pseudostems reach about 3 m. in height and 15–20 cm. in diameter at the base, and are green with a purplish flush and blackish-purple markings, quite devoid of wax. Leaf-blades are 2–2·5 m. long, 60–65 cm. wide (all dimensions are probably bigger in Sarawak as our plant is checked annually by the dry season) on petioles about 60 cm. long. The broad corrugated auricles at the region where the petiole joins the sheath are conspicuous and characteristic.

The female flowers (5–8 per bract in a single row) have a compound tepal 6–7 cm. long, with two prominent thickened keels and hyaline margins, its lobes are small (2–3 mm.) and the accessory teeth minute. The free tepal is 4·5–5 cm. long and the staminodes are about 1 cm. long.

The male bud in advanced blooming is very broadly ovate, with the bracts strongly imbricate. The bracts, described by Beccari as " rosy-vinous ", are indeed a very handsome crimson-purple, green at the extreme tip, broadly ovate and blunt, shining with a polished appearance and stiff in texture. There is nothing unusual about the dehiscence of the anthers and extrusion of the pollen.

The seeds of our plant are a trifle smaller than Beccari's, 7 mm. long and 5 mm. wide, but otherwise answer excellently to his description, having a distinct waist at the middle (marking the base of the perisperm chamber within) and being rugose-tuberculate above this line and smooth below.

On this characteristic seed shape the species is referable to my section *Callimusa*, and it has the chromosome number of that section (n=10) (count recorded in J. Genetics **30** : 16 (1935) as " *Musa* sp. undet. from Sarawak ", where it is erroneously classified under §*Rhodochlamys*). *M. borneensis* crosses with other species of §*Callimusa* and also with *M. textilis*. It is interesting as being the largest plant yet described in its section, and also as having one of the largest non-parthenocarpic fruits n the whole genus. I saw numerous plants of this species along the Simanggang Road, 26 miles from Kuching, in 1948.

CLASSIFICATION OF THE BANANAS.

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III. Critical Notes on Species.

s. **M. violascens** *Ridley* in Trans. Linn. Soc. Ser. 2, **3** : 384 (1893) and **M. gracilis** *Holttum*, sp. nov.

The first of these species is Introduction No. 108 in the I.C.T.A. collection and was received as seeds from Malaya in September 1931. The parent plants grew on the Government Experimental Plantation at Serdang, Selangor.

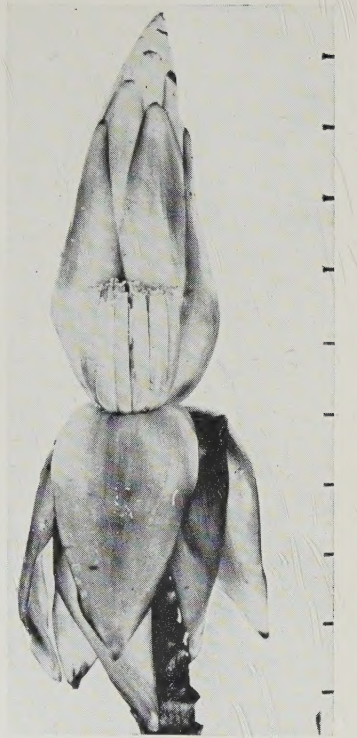

FIG. 1. Male bud in advanced blooming.

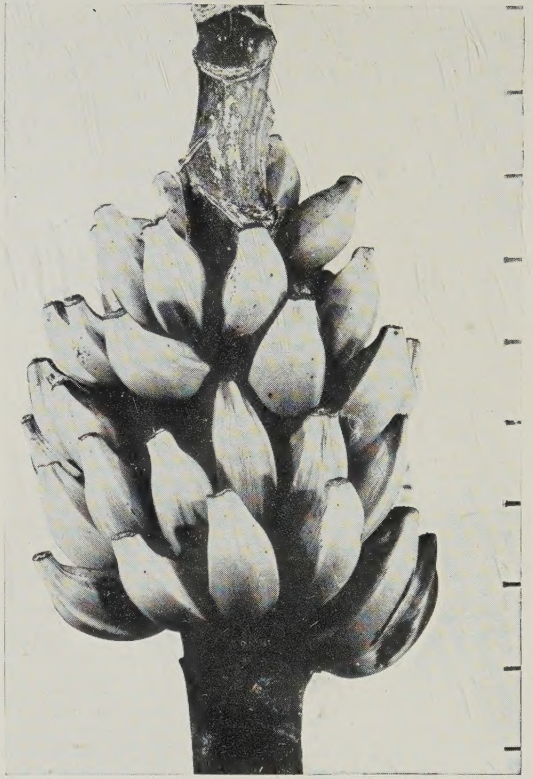

FIG. 2. Fruit bunch approaching maturity.
Scales in inches.

Musa violascens Ridley. *Photographs by K. S. Dodds.*

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The characters of I.R. 108 conform so badly to Ridley's descriptions of *M. violascens* (*loc. cit. et in* Fl. Malay Penins. 4, 295 : 1924) that for some time I thought it must be a distinct and undescribed species. For instance, Ridley says the flowers are few and arranged in single rows in each bract, whereas in our plant the bracts subtend about 10 flowers in two rows. He also says that " the petal has the form of that of the Eu-musa section ", but in our plant the free tepal (scarcely shorter than the compound) certainly has *not* such a form.

On a recent visit to Malaya (1947) I found that our I.R. 108 is truly representative of a species very common in many parts of the peninsula, and in discussion of its nomenclature with Mr. R. E. Holttum at the Singapore Botanic Garden was satisfied that it is correctly referred to *M. violascens* Ridley. Mr. Holttum had observed similar discrepancies between the original description and the type specimen at Singapore and found the common species to agree with the type. A description of the Trinidad material follows :

Plant stooling freely. Pseudostems slender, 1–2 metres high, green, devoid of any perceptible wax bloom. Leaf blades up to 2 m. long or longer, 50 cm. wide, shining above, dull beneath but not glaucous ; midribs green above, like the lamina, paler beneath; petioles 40–50 cm. long, with scarious margins, which are very slight above but broaden below and where the petiole passes into the leaf-sheath are expanded into conspicuous corrugate auricles.

Inflorescence erect, very shortly exserted above the uppermost leaf-sheath, so that the lowermost cluster of flowers very often does not get free ; peduncle about 3 cm. thick, shortly pubescent ; first sterile bract usually with a green lamina, this followed by a sterile true bract, white outside, light violet within; first fertile bract up to 20 cm. long, variegated white, pale violet and dark violet, the later ones gradually becoming darker, all with a green tip. Flowers of the basal bracts female, usually 4–8 " hands " of 8–10 flowers each, in two rows ; flowers of the upper bracts male.

Female flowers 8–9 cm. long overall ; ovary 3·5–4 cm. long, white, glabrous ; compound tepal 4·5 cm. long, white, its tip and lobes deep yellow, lateral lobes 0·5 cm. long with a dorsal filiform appendage of 3 mm. ; free tepal nearly 4 cm. long, 1·2 cm. wide, not boat-shaped or even very strongly concave, truncate at apex, not apiculate ; staminodes short, of various lengths, the longest about 1·5 cm.

Male bud in advanced blooming top-shaped, very acute, the bracts very strongly imbricate (outermost only about two-thirds the length of the bud). Bracts pale violet or mauve, often splashed with white or with darker violet, green at the extreme tip ; outer surface quite plane, shining with a polished appearance, inner surface duller but similar in colour to the outside.,Bracts not revolute on fading but strongly reflexed against the rachis and tending to persist in the withered condition.

Male flowers about 10 to each bract in two rows (at least in the lower and middle bracts ; sometimes fewer and uniseriate in very old buds) ; compound tepal 4–5 cm. long, white at base, green towards the tip, with yellow lobes, outer lobes each with a filiform dorsal appendage 0·5 cm. long ; free tepal scarcely shorter than the compound tepal, white, narrow-oblong, blunt or truncate, with only an obsolete apicula.

Fruit bunch compact. Individual fruit 4–7 cm. long, about 2 cm. in diameter, oblong, rather distinctly angled at maturity, narrowed or rounded into a subsessile base, usually narrowed more gradually to the apex, obsoletely or distinctly but not abruptly acuminate, the tip broadly truncate ; pericarp about 1 mm. thick, blackening at full ripeness ; pulp scanty, cream-coloured.

Seeds numerous, cylindrical, 6 mm. long, 4 mm. in diameter, black, minutely tuberculate, the transverse line marking the perisperm chamber not conspicuous.

Some quantitative variation is to be expected between individuals and our Trinidad material, clonally propagated from a single seedling and grown under garden conditions, is not necessarily typical in its dimensions. Holttum's observations on wild plants and dried specimens are that the female flowers are 5–8 per bract and the fruits slightly larger than ours, 6–8 cm. or even up to 10 cm. long and 2·5–3 cm. in diameter. He also notes that on male flowers examined by him the filiform appendage of the lateral lobes was barely 1 mm. long. These, however, are unessential points casting no doubt on the specific identity of I.R. 108.

M. violascens is one of the two species of *Musa* very common in Malaya, the other being *M. acuminata*, and the two very often occur together. It has both the chromosome number (n=10, recorded by Cheesman, J. Genetics, **30,** 46 : 1935) and the cylindrical seed characteristic of the section *Callimusa*.

M. campestris Beccari, Nelle Foreste di Borneo, 622 (1902) must from its description be a very similar plant, but differs in bract colour and in its inflorescence axis being glabrous at maturity of the fruit. *M. salaccensis* Zollinger, Syst. Verz. Ind. Archip. 74 (1854) of Java and Sumatra is also clearly allied but distinct.

Another species of the section *Callimusa* occurs in Malaya. It was first collected by Ridley and has now been named and described from more complete material by Holttum, who has very kindly supplied the following description and notes for publication in this place :

Musa gracilis *Holttum*, sp. nov.—Caudex (vaginis foliorum constructus) 60–200 cm. altus, basi c. 8 cm. crassus ; vaginae purpureo-suffusae ; lamina folii 90–150 cm. longa, 25–35 cm. lata (interdum minor), omnino pallide viridis ; petiolus 30–70 cm. longus. Inflorescentia erecta, 60 cm. vel ultra alta, rachis dense pilis brevibus patentibus vestita, interdum glabrescens ; flores feminei in fasciculis 3–8, 2·5–4 cm. dissitis, dispositi, in quoque fasciculo 2–4 flores ; bracteae infimae 15 cm. longae, 4·5 cm. latae, deciduae, violaceae, apice virides ; bracteae florum masculorum minores, mox deciduae ; tepalum compositum (floris masculi) 4 cm. longum, pallide viride, lobis lutescentibus, lobi exteriores appendiculis 3 mm. longis instructi ; tepalum liberum fere 4 cm. longum, oblongum, obtusum. Fructus fere erecti, c. 10 cm. longi, 2–2·5 cm. crassi, apice obtusi, non rostrati, valde 2–3 angulati, pallide virides vel glaucescentes interdum violaceo-striati ; stipites fructuum c. 2 cm. longi, in juventute hirsutae, glabrescentes.

Trengganu : Ulu Bendong, Kajang, Kemaman, 500 ft., in hillside forest by streams, *S.F.N.* 30056, leg. E. J. H. Corner, 30.10.1935 (type).

JOHORE : G. Panti, west, by streams in Dryobalanops forest, S.F.N. 30959 (Corner) ; Sungei Pelepah, near G. Panti, 200 ft., S.N.F. 20011 (Md Nur) ; G. Pulai, *Ridley* 12146 ; Kukub, Tempayan River, *Ridley* 13276 ; Kluang-Mersing Road, 2nd mile, *S.F.N.* 9335 (Holttum) ; Labis, *S.F.N.* 38204 (Henderson).

MALACCA : Batang Malacca Road, *Derry* s.n., July 1892.

This species is distinct from *M. violascens* in its much smaller size, deciduous bracts and longer, proportionately more slender fruits, which are never more than 4 to a hand, in one row. Corner describes the fruits of the type specimen as " light greenish white ", Ridley those from the Tempayan river as glaucous, and those from G. Pulai as having " longitudinal violet bands ", Henderson those from Labis as " pale glaucous green ". The bracts are apparently sometimes almost white, but always with some suffusion of violet-purple.

This is the species described briefly but not named by Ridley in *Flora Mal. Penin.* 4 : 295. It is evidently not uncommon in Johore, and has been found as far north as Kemaman on the east coast, but not north of Malacca on the west.

Lilies of the World.—This was originally intended to be a third edition of *Woodcock and Coutts, Lilies, their Cultivation and Management* (see Kew Bull. 1935, p. 582), but in the course of revision " so much new matter had to be added, so much of the original book modified or deleted, that the work became essentially a new book " and it has therefore been published as such.* It follows the pattern of the earlier work and much of the text has been taken over unchanged, but considerable alterations and additions have been necessary to bring the work up to date, especially in view of the critical revision that has been made in the nomenclature. The chief innovation, and one which immensely enhances the value and usefulness of the work, is the provision of references to the literature of each species. Attention has also been paid to the " set-up " of the text, and the use of bold-face type for the names of the plants in the alphabetical list greatly facilitates reference. The additions and emendations are the work of Mr. W. T. Stearn. In the Preface Judge Woodcock explains that the deterioration in his own eyesight made the unaided preparation of the book impossible, and he therefore again enlisted the co-operation of Mr. Stearn, " who provided much valuable material for the former book and to whom practically the whole of the preparation of the present book must be ascribed." To those who know Mr. Stearn, this will be sufficient guarantee that the work has been well, carefully, and very thoroughly done. The book fully comes up to expectation, and is undoubtedly a decided improvement on its predecessor. The work is encyclopaedic in scope, and if all the available information about lilies is not actually set out within the 400 or so pages of this volume, a very full synopsis is provided, and the references to literature given throughout, together with the excellent bibliography at the end, will enable the reader to fill the gaps.

*Lilies of the World. Their Cultivation and Classification. By H. B. Drysdale Woodcock and William T. Stearn. pp. 431, 96 photographs, and 41 line drawings. London, Country Life Limited. 1950. Price 35/- net.

Like the earlier work, this book is divided in two Parts. Part I opens with a pleasant Introduction, followed by a chapter on the structure of lilies and the functions of their various parts, designed to help the amateur to understand the biological characteristics of the plants. The rest of this Part (some 66 pages) is devoted to cultivation, and its scope is shown by the chapter-headings, *viz.* : Climate Position and Soils, Easy and Difficult Lilies, Their Place in the Garden, General Cultivation, Lilies in Pots and in the Greenhouse, Propagation, Hybridization, and Enemies of the Lily. Part II starts with a brief account of the classification of *Lilium* and a note on its related genera. This is followed by a short chapter on geographical distribution, and then comes the main part of the book, some 240 pages devoted to the species and hybrids of Lilium (arranged alphabetically) and the species of the closely related genera, *Cardiocrinum*, *Notholirion* and *Korolkowia*. For good measure there are six appendices dealing respectively with The Genus Nomocharis, Latin Diagnoses (for a few names not hitherto validly published), Subdivisions of Lilium, Bibliography, Storage and Packing of Lily Bulbs, and short Glossary of Technical Terms. There is an excellent Index, and, finally, the whole work is enriched by some 137 well-chosen illustrations which include at least one picture of every species of *Lilium* enumerated.

The text presents a great deal of accurate information in a very readable form, and it is not too much to say that this book will prove invaluable to all interested in lilies and their allies—to the experienced professional botanist as much as to the veriest amateur gardener. It has but one defect : there is no key to the species of *Lilium*. The reason for this omission is not hard to guess, for *Lilium* is a genus where differences are often of the subtle kind not easily set out in words, and the difficulty in providing a key that would be workable for any but the experts is formidable indeed. A difficult key might well be a source of error instead of a means of identification, and in a book like this, which is designed for the beginner as much as for the expert, the authors are probably wise to omit the key altogether. The book is well-printed and forms a neat and handsome volume. The authors must be congratulated on an excellent and scholarly work.

J. Robert Sealy.

Horticultural Abstracts*.—The appearance of a five year index to Horticultural Abstracts, covering volumes XI–XV will be welcomed by all who consult this useful publication. The index is well arranged and includes a subject analysis of abstracts, a full and comprehensive subject index, alphabetically arranged with useful cross references, followed by an index of authors. The value of Horticultural Abstracts will be greatly enhanced by the provision of such a carefully prepared and exhaustive index.

H.S.M.

*Index to Horticultural Abstracts. Volumes XI-XV. 1941-1945 (1949). Compiled by D. Akenhead. Commonwealth Bureau of Horticulture and Plantation Crops ; East Malling, Kent : Commonwealth Agricultural Bureau, Central Sales Branch, Penglais, Aberystwyth. Price 35/-.

NOTES ON AFRICAN MARANTACEAE : I

E. Milne-Redhead.

Trachyphrynium as recognized by K. Schumann.

When Bentham (1883) described the genus *Trachyphrynium* he did not cite any type species for his generic name. He states that the genus contained 4 or 5 species from tropical West Africa of which one also had been collected in Niamniam-land by Schweinfurth under his number 3061. At this time none of the species included by Bentham in *Trachyphrynium* had been described. His generic description is based, so far as the fruit is concerned, on the species represented by the Schweinfurth gathering mentioned above, as that is the only known species with a dehiscent fruit and arillate seed.

In dealing with the *Marantaceae* from Tropical Africa in the Berlin Herbarium, K. Schumann (1892) divided Bentham's genus into two parts. The lesser part, consisting of a single species, he placed in a new genus, *Hybophrynium*, as a new species, *H. braunianum* K. Schum. ,whilst the greater part, consisting of four species, he retained in *Trachyphrynium*. Schumann distinguished his *Hybophrynium* from *Trachyphrynium* principally on account of its having dehiscent fruits and arillate seeds. There would appear to be no satisfactory diagnostic character in the flowers of these two genera as defined by Schumann.

Now it so happens that the only specimen cited by Bentham, namely Schweinfurth 3061, is the species which Schumann called *Hybophrynium braunianum*. In view of this and the fact that Bentham drew the more important part of his description from the fruits and seeds of this species, one is bound to consider it the type species of the generic name *Trachyphrynium*. That being so, it is necessary to decide what to call the other species placed in *Trachyphrynium* by Schumann and others.

In his account of the *Marantaceae* in Engler's Pflanzenreich, Schumann (1902) recognised five species of *Trachyphrynium*. He distinguished the genus from his *Hybophrynium* on the fruits being indehiscent and the seeds exarillate. He divides it into two subgenera, *Lasiodelphys* K. Schum. containing *T. danckelmanianum* J. Braun et K. Schum. and *T. liebrechtsianum* De Wild. et Th. Dur. on the one hand and *Hypselodelphys* containing *T. violaceum* Ridl., *T. poggeanum* K. Schum., and *T. zenkerianum* K. Schum. on the other.

Subgenus *Lasiodelphys* K. Schum. was characterised by Schumann as having a strongly circinnate inflorescence, bracts which are strongly folded, suborbicular, persistent and which separate from each other before flowering, pairs of flowers arranged in twos and a villous ovary. He described subgenus *Hypselodelphys* K. Schum. as having the inflorescence less markedly or not at all circinnate, the bracts convolute, oblong, caducous and densely imbricate before flowering, the pairs of flowers solitary, and a glabrous muriculate ovary. He does not mention the fruits in his diagnosis of subgenus *Lasiodelphys* whilst the muricate nature of the fruits of the three species of subgenus *Hypselodelphys* is not mentioned in the diagnostic key, as he considered this character to be generic.

The reason for this omission is not far to seek. Schumann figures, as the fruit of *T. danckelmanianum*, a fruit which almost certainly does not

belong to that species, and which in my opinion is that of *T. poggeanum*, whilst, at that time, the fruit of *T. liebrechtsianum* was unknown. Schumann therefore believed that the fruits of all the species were essentially of the same nature, namely muricate. He did not realise that only those plants which had the muriculate ovary could produce a muricate fruit!

Léonard (1949), who was familiar with the Congo species of *Marantaceae*, both in the field and in the herbarium, had noticed that the fruit of *T. liebrechtsianum* were not muricate and did not conform with those of the genus *Trachyphrynium*, as recognized by Schumann, whilst the perispermatic canal was of a different shape. He therefore described a new genus for *T. liebrechtsianum*, for which he proposed the name *Haumania* J. Léonard. Working quite independently, I had come to the same conclusion. Aided by the presence of a number of gatherings of the Cameroons species, *T. danckelmanianum*, in the Kew Herbarium, including a few on loan from Brussels, I considered that *T. liebrechtsianum* and *T. danckelmanianum* were undoubtedly congeneric*, and that Schumann's subgenus *Lasiodelphys* required raising to generic rank. Apart from the fruit and seed characters mentioned by Léonard, and the diagnostic characters for subgenus *Lasiodelphys* given by Schumann, there are some fundamental differences in the structure of the inflorescence which add strength to this view. Most striking of these is perhaps the absence of the small, thickened, subglandular, almost horny bracteoles used by Schumann (1902) to separate a number of genera in his *conspectus generum* on page 30. These bracteoles are present in subgenus *Hypselodelphys* and in *Trachyphrynium* Benth. (*Hybophrynium*, K. Schum.).

We have therefore a name for one part of Schumann's genus *Trachyphrynium*, namely *Haumania* J. Léonard. It is here proposed to use Schumann's subgeneric name for the other part of his *Trachyphrynium*, calling the genus *Hypselodelphys* (K. Schum.) Milne-Redhead.

KEY TO DISTINGUISH *TRACHYPHRYNIUM* BENTH. FROM THE GENERA WITH WHICH IT HAS BEEN CONFUSED.

1. Bracts oblong-lanceolate, convolute, never spreading, caducous after flowering time; each pair of flowers provided with two short horny bracteoles ; ovary glabrous, densely muriculate ; fruit strongly and densely muricate **2**

Bracts suborbicular, strongly folded not convolute, spreading in anthesis and persisting after the flowers have fallen ; each pair of flowers enclosed within a large 2-keeled bracteole ; ovary densely hairy ; fruit irregularly warty-rugose with a few persisting hairs . . 3. *Haumania*

2. Fruits dehiscent ; seeds with a large aril . . 1. *Trachyphrynium*

Fruits indehiscent ; seeds without an aril . . 2. *Hypselodelphys*

Hypselodelphys (*K. Schum.*) *Milne-Redhead*, genus nova.

[*Trachyphrynium* Benth. in Benth. et Hook. f., Gen. Pl. **3,** 651 (1883), pro parte, excl. sp. capsulis dehiscentibus.]

*De Wilderman & Th. Durand (1900) had stressed the close relationship of these two species.

[*Trachyphrynium* (non Benth.).—K. Schum. in Engl., Bot. Jahrb. **15,** 432 (1892) et in Engl. & Prantl, Nat. Pflanzenfam., Nachtr. **2,** 94 (1897), pro parte, excl. *T. danckelmanianum* J. Braun et K. Schum.]

[*Trachyphrynium* (non Benth.).—Bak. in Dyer, Fl. Trop. Afr. **7,** 318 (1898), pro parte, excl. *T. danckelmanianum* J. Braun et K. Schum. et *T. braunianum* (K. Schum.) Bak.]

[*Trachyphrynium* (non Benth.).—K. Schum. in Engl., Pflanzenr. IV, **48,** 42 (1902), pro parte, quoad subgenus *Hyselodelphys* K. Schum.]

[*Trachyphrynium* (non Benth.).—Lemée, Dict. Gen. Phan. **6,** 643 (1935), pro parte, excl. spec. ovariis velutinis.]

[*Trachyphrynium* (non Benth.).—Hutch. in Hutch. & Dalz. Fl. W. Trop. Afr. **2,** 337 (1936), pro parte, excl. *T. danckelmanianum* J. Braun et K. Schum.]

Plantae subscandentes culmis graciliter bambusiformibus demum superne ramosis foliosis instructae. *Folia* brevipetiolata ; lamina oblonga elliptica vel ovata, acuminata, asymmetrica, antitropa ; petiolus inferne ± longe vaginans, inde in partem plerumque brevissimam teretem continuo desinens, demum apice in partem teretem quasi pulviniformem articulo conspicuo sejunctam abiens, parte pulviniformi apice sub ipsam laminam conspicue truncato quasi pseudo-articulo a costa abrupte sejuncta. *Cymae* compositae in spicam simplicem vel ramosam ± cincinnatam dispositae. *Bracteae* abaxillae ante anthesin arcte imbricatae, convolutae, alabastra et cymas superiores includentes, caducae ; bracteae adaxillae paria florum solitaria includentes, caducae ; flores in pedunculo gemini, uterque bracteola adossata munitus. *Sepala* 3, libera, leviter inaequales. *Petala* 3, unguibus in tubum conniventibus ; laminae reflexae, extus saepe strigulosae. *Staminodia* exteriora petaloidea ; staminoidium interius cucullatum, longe calcaratum. *Anthera* monotheca. *Ovarium* dense muriculatum, triloculare loculis uniovulatis ; ovulum a basi erectum ; stylus inclusus, basi tubo stamineo adnatus, crassiusculus, apice incurvus ; stigma obliquum leviter concavum. *Fructus* tricoccus, indehiscens, dense muricatus. *Semina* exarillata.

Key to the species of *Hypselodelphys*

1. Inflorescences densely arranged, and much branched . . . . . 3. *H. zenkeriana*
Inflorescences loosely arranged, little branched **2**

2. Fruits obpyramidal with well-marked corners ; cymes strongly cincinnate, with internodes long . . . . . 2. *H. violacea*
Fruits with more or less spherical lobes ; cymes not strongly cincinnate, with internodes short . . . . . 1. *H. poggeana*

In the following enumeration of specimens, all are in the Herbarium of the Royal Botanic Gardens, Kew (K.), except those shown as being in the British Museum Herbarium (B.M.) or the Herbarium of the Jardin Botanique de l'État, Brussels (Bx.), or the Forest Herbarium, Ibadan, Nigeria (F.H.I.).

1. **Hypselodelphys poggeana** (*K. Schum.*) *Milne-Redhead*, comb. nov. *Trachyphrynium poggeanum* K. Schum. in Engl., Bot. Jahrb. **15,** 431 (1892).

Sierra Leone. Moyamba District. Kissi Town, *Don* s.n. (B.M.). Wilberforce, *H. H. Johnston* 97. Mt. Leicester, *Barter* s.n. Njala, *Deighton* 1839. Tarania, *Deighton* 3372, 4615. Karene District. Duunia, *Scott-Elliot* 4884 (B.M., K.). Kambia District. Kambia, *Scott-Elliot* 4508 (B.M., K.). Kofin Mt., near Kukuna, *Scott-Elliot* 4622 (B.M., K.). Bombali District. Kumrabai, *N. W. Thomas* 6776. Bo District. Near Bumpe, *Deighton* 4968. Kenema District. Kenema, *N. W. Thomas* 7564, 7748. Pujehun District. Pujehun, *Lane-Poole*, 158. Without locality. *Afzelius* (B.M.), *N. W. Thomas* 8062, 8354.

Liberia. Without locality, *Linder* 347. Webo District, Diella, *Baldwin* 6338.

Gold Coast. Accra District. Near Nsawam, *Dalziel* 8291. Kpokoase, north of Achimota, *Irvine* 193.

Nigeria. Colony Division? Lagos, *Moloney* XXI. Abeokuta Division. Olokemeji, *Conservator of Forests* XI. Oyo Division. Ibadan, *Symington* 3358 (F.H.I.). Akure Division. Idanre above Aweba, *Brenan* 8689. ? Division. Yoruba Forest as far as Ijayo, *Barter* 3329. Onitsha Division. Awka, *N. W. Thomas* 43. Calabar Division. Oban, *Talbot* s.n. (K.) 874 (B.M., K.).

Gaboon. Corisco Bay, *Mann* 1909.

Portuguese Congo. Mayombe Forest, *Gossweiler* 7595.

Belgian Congo. District du Bas-Congo. Kimuenza, *Gillet* s.n. (Bx.). Near Sanda, *Gillet* 3572 (Bx.), *Gillet* 3420 (Bx.). Kutu near Lac Léopoldville II, *Laurent* s.n. (Bx.). District forestier central. Éala, *Pynaert* 672 (Bx.), *Lebrun* 239 *Léonard* 12 (K), 186 (Bx.), *Coûteaux* 272 (Bx.), *Staner* 937 (Bx.), *Laurent* 1963 (Br.). Yangambi, *Louis* 3971 (Bx., K.), 7371 (Bx.), 8802 (Bx., K.), 14704 (Bx.), *Germain* 4629 (K.), 4632 (K.).

Angola. Lunda District. Dundo near River Luachima, *Gossweiler* 13677, 13685. Cuanza Norte District. Cazengo, *Gossweiler* 619.

The type specimen of *Trachyphrynium poggeana* K. Schum. is either Pogge 1445 or 1453, both specimens coming from Angola, " in der Campine " according to Schuman, a locality which I have been unable to trace. I have not seen these specimens, and am therefore unable to choose a lectotype. The other two specimens cited by Schumann (1892), p. 432, were later referred by Schumann (1902) to a new species, *Trachyphrynium zenkerianum* K. Schum. I do not consider that the variation in the degree of indumentum on the rhachis of the inflorescence mentioned by Schumann (1902), is of specific significance. The rounded cocci densely muricate with pyramidal processes about 2 mm. long are characteristic of the species.

2. **Hypselodelphys violacea** (*Ridl.*) *Milne-Redhead*, comb. nov. *Trachyphrynium violaceum* Ridl. in Journ. Bot. **25,** 133 (1887).

Sierra Leone. Pujehun District. Near Potoru, *Deighton* 3796. Pujehun, *Deighton* 5273. Sefalu, *Deighton* 5272.

Liberia. Kolahun District. Vahon, *Baldwin* 10242. Grand Cape Mount Co. Begwai, *Bunting* 106 (B.M.). Gbarnga District. Gbanga [Gbarnga] *Linder* 629. Salala District. Near Kakatown [Kakata] *Whyte* s.n. Webo District. Yratoke, *Baldwin* 6261.

Portuguese Congo. Mayombe Forest, *Gossweiler* 8071.

Angola. Cuanza Norte District. Pungo Andongo, Mutollo, *Welwitsch* 6441 (type, B.M.). Pungo Andongo, Sobata Galanga, *Welwitsch* 6441b (B.M.). Cazengo, *Gossweiler* 4879.

I feel sure that this plant must be of more frequent occurrence than the above citations suggest. A fruit, damaged and immature, of *H. violacea* is in a packet on a sheet of *H. poggeana* from Nigeria (Barter 3329) suggesting that the two species may have been growing in proximity. I have not seen it elsewhere from Nigeria*, nor have I seen any material of it from the Gold Coast. A specimen of *H. zenkeriana* in the Brussels Herbarium (Zenker 274 of 1913) has a typical fruit of *H. violacea* detached and mounted on the sheet, suggesting that *H. violacea* may also occur at Bipindi in the French Cameroons. There seems to be a strong tendency for fruits of *Hypselodelphys* to be collected loose and attributed to the wrong species ; this has happened in more than one gathering received at Kew during this past year.

Specimen at Kew from Barombi, in the British Cameroons (Preuss 144, 321), named as *Trachyphrynium preussianum* K. Schum. may belong here, but they are not typical of *H. violacea*, and I prefer to await better material before being more definite. The fruit of *T. preussianum* figured by Schumann (1892), p. 429, fig. N, and (1902), p. 43, fig N, is typical of *H. violacea*, but here again proof that it belonged to a species similar to the two Preuss specimens just mentioned is lacking.

3. **H. zenkeriana** (*K. Schum.*) *Milne-Redhead*, comb. nov.

Trachyphrynium zenkerianum K. Schum. in Engl., Pflanzenr. IV, **48,** 45 (1902).

[*T. poggeanum* K. Schum. in Engl., Bot. Jahrb. **15,** 431 (1892), pro parte, quoad exempl. kamerunensia].

French Cameroons. Bipinde, *Zenker* 1223 (type dupl. B.M., K.), *Zenker* (coll. 1913) 274 (Bx.).

This species is easily recognized by its densely aggregated inflorescences. Schumann describes the fruit as having globose cocci, but, as mentioned under *H. violacea* above, Zenker 274 at Brussels has a detached fruit with pointed cocci mounted on the sheet. Observation in the field and further careful collecting will be needed before true nature of the fruit of *H. zenkerianum* can be finally settled.

Haumania *J. Léonard* in Bull. Jard. Bot. Brux. **19,** 453 (1949).

[*Trachyphrynium* (non Benth.).—K. Schum. in Engl., Bot. Jahrb. **15,** 432 (1892) et in Engl. & Prantl, Nat. Pflanzenfam., Nachtr. 2, 94 (1897), pro parte, quoad *T. danckelmanianum* J. Braun. et K. Schum.]

*Whilst this note was in the press, I have seen excellent material of *H. violacea* collected in Nigeria by my colleague, Mr. R. D. Meikle, so the following citation should be added to those given above :—Nigeria. Ibadan, near waterworks, in shade of secondary forest, 28 Jan. 1950, *Meikle* 1110.

[*Trachyphrynium* (non Benth.).—Bak. in Dyer, Fl. Trop. Afr. **7,** 318 (1898), pro parte, quoad *T. danckelmanianum* J. Braun et K. Schum.]

[*Trachyphrynium* (non Benth.).—K. Schum. in Engl., Pflanzenr. IV, **48,** 42 (1902), pro parte, quoad subgenus *Lasiodelphys* K. Schum.]

[*Trachyphrynium* (non Benth.).—Lemée, Dict. Gen. Phan. **6,** 643 (1935), pro parte, quoad spec. ovariis velutinis]

[*Trachyphrynium* (non Benth.).—Hutch. in Hutch. & Dalz., Fl. W. Trop. Afr. **2,** 337 (1936), pro parte, quoad *T. danckelmanianum* J. Braun et K. Schum.]

Key to the species of *Haumania*

Stems armed with small curved prickles ; abaxial bract of inflorescence 2·0–2·3 cm. long ; sepals about 4 mm. long . . . . . 1. *danckelmaniana*

Stems unarmed ; abaxial bract of inflorescence 2·5–3·5 cm. long ; sepals about 11 mm. long . . . . . 2. *liebrechtsiana*

1. **Haumania danckelmaniana** (*J. Braun et K. Schum.*) *Milne-Redhead*, comb. nov.

Trachyphrynium danckelmaniana J. Braun et K. Schum. in Mitth. Deutsch. Schutzg. **2,** 153 (1889).

British Cameroons. Barombi Station, *Preuss* 255. Dengding, 5° 10′ N., 13° 35′ E., *Mildbraed* 8825.

French Cameroons. Bipinde, *Zenker* 929, 3146 (Bx., K.) Yaunde Station, *Zenker & Standt* 610. Minfia, *Zenker* s.n. (Bx.) Near Douala, *Chew* s.n.

Spanish Guinea. Nkolentangau, *Tessmann* 60. Near Campo, *Tessmann* 684.

Gaboon. Sibange Farm, *Soyaux* 85.

I have not yet seen the fruit of this species, but I have no doubt that it is not unlike that of the next species, and that the fruit figured by Schumann (1902), p. 43, fig. L, M, belongs to *Hypselodelphys poggeana.* I am informed by Mr. Chew, who is familiar with this plant around Douala, that it grows only in the areas of the heaviest rainfall, which may account for its rather restricted distribution.

2. **Haumania liebrechtsiana** (*De Wild. et Th. Dur.*) *J. Léonard* in Bull. Jard. Bot. Brux. **19,** 454 (1949).

Trachyrynium liebrechtsianum De Wild. et Th. Dur. in Bull. Soc. Bot. Belg. **38,** 147 (1899).

Portuguese Congo. Mayombe Forest, *Gossweiler* 6880, 8181, 8273.

Belgian Congo. District du Mayumbe. Temvo, *Vermoesen* 1481 (Bx.). Mayumbe, *Kesteleyn* s.n. (Bx.). District du Bas-Congo. Kitwit, *Vanderyst* 3087 (Bx.). Kimuenza, *Gillet* 1972 (Bx.). District du Kasai. Bena-Dibele, *Laurent* s.n. (Bx.), *Claessens* 206 (Bx.). Bena Makima, *Lescrauwaet* 267 (Bx.). District du Forestier Central. Éala and neighbourhood, *Léonard* 15 (K.), 187 (Bx.), *Robyns* 723 (K., Bx.), *Louis* 2199 (Bx.), *Laurent* 1125 (Bx.), 1961 (Bx.), *Seret* 1044 (Bx.), *Lebrun* 253 (Bx.), 527 (Bx.), *Naunan* 7 (Bx.), *Leemans* 542 (Bx.), *Pynaert* 1414 (Bx.), 1561 (Bx.), 1630 Bx.). Wendji to Coquilhatville, *Lebrun* 622 (Bx.). Bolenge, *Laurent*

148 (Bx.). Lisala, *Bruneil* s.n. (Bx.). Yambata, *Montchal* 59 (Bx.), 177 (Bx.), *De Giorgi* 1409 (Bx.). Dundusana, *Mortchan* 217 (Bx.). Mobwasa, *Reygaert* 286 (Bx.), *Lemaire* 187 (Bx.), *Herb. Bang.* 397 (Bx.), *De Giorgi* 682 (Bx.). Basoko, *Claessens* 638 (Bx.). Bas-Uele, without locality, *Dewulf* 926 (Bx.), Buka, *Seret* 888 (Bx.). Near Banalia, *Galdermans* 12 (Bx.). Yangambi and neighbourhood, *Louis* 1513 (Bx.), 3853 (Bx.). 3918 (Bx.), 5544 (Bx., K.), 8092 (Bx.), 8668 (Bx.), 8934 (Bx.), 9781, (Bx., K.), 10050 (Bx.), 10242 (Bx.), 13220 (Bx.), 13967 (Bx.), 14895 (Bx.), *Bequaert* 1359 (Bx.). Kama to Lumuna, *Lebrun* 5853 (Bx., K.).

This species, as will be seen by the above citations, is widely spread in the equatorial forests of the Congo Basin, but is unkown from elsewhere apart from the nearby Mayombe Forest. It's distribution does not appear to overlap that of its ally, *H. danckelmanianum.* The rich material of *H. liebrechtsiana* at Brussels has been only partly cited here ; specimens without localities on the labels and with localities that I could not decipher have been omitted.

Acknowledgments

The above work has been greatly assisted by the loan of the rich material from the Jardin Botanique de l'État, Brussels, through the kindness of Professor W. Robyns, to whom I offer my sincere thanks. I am also indebted to Dr. J. Léonard of I.N.É.A.C., who has placed at my disposal the excellent material, both dried and preserved in liquid, of the genera collected by him and by the late Dr. J. Louis in the Congo, and who has most kindly allowed me to see the typescript of his most valuable paper on the *Marantaceae* of the Belgian Congo, shortly to be published. His ready co-operation is very greatly appreciated. I would also like to thank the Keeper of Botany at the Natural History Museum, and my friend Mr. J. E. Dandy for facilities and help in consulting specimens in the Department of Botany.

The collections at Kew of these genera, as of the African *Marantaceae* in general, have been greatly enriched through the efforts of certain correspondents in Africa. It is impossible here to mention all their names, but I would like to thank them for their great assistance, in particular Mr. F. C. Deighton, O.B.E., Department of Agriculture, Sierra Leone, Dr. J. T. Baldwin Jr., William and Mary College, Virginia, Mr. R. W. J. Keay, Forest Herbarium, Ibadan, Dr. R. Germain, I.N.É.A.C., Yangambi, Belgian Congo, and Dr. W. J. Eggeling, Conservator of Forests, Uganda. Much help has also been received from my colleagues Messrs. J. P. M. Brenan, R. D. Meikle, H. K. Airy Shaw and P. Taylor.

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National Parks, Reserves and Phytogeographical Districts of the Belgian Congo.—Each of the two works noticed here consists of a map accompanied by 10 pages of explanatory text in French and Flemish. The first one shows, marked in colour on the map, which is on a scale of 1 : 5,000,000, the National Parks, game and forest reserves of the Belgian Congo and Ruanda-Urundi, and the map is admirably clearly printed and easy to understand. The text gives a brief history of how the making of reserves in the Congo has developed, followed by a definition of their purposes, and then a numbered list of the reserves themselves and their position, the numbers being correlated with those on the map.

The second work treats the plant-geographical districts of the Belgian Congo and Ruanda-Urundi in the same way, and is equally clear and concise. The text briefly describes the position, climate and vegetation, mentioning a number of the principal species, of each of the eleven districts.

Both these maps will be of great value not only to botanists, but also to geographers and all who are interested in the wild life of tropical Africa. That on the National Parks is particularly topical in view of the creation of similar parks in England, and of the urgent need for them in British territories in Africa, before unique and irreplaceable areas of vegetation have been sacrificed to politicians' views on economics and expediency.

That on the plant-geographical districts is a necessity for botanists, since these districts are being used standardly not only in the publication of new species from the Jardin Botanique de l'Etat in Brussels, but also in the great new Flore du Congo Belge et du Ruanda-Urundi.

J. P. M. Brenan.

Atlas Général du Congo : Les Parcs Nationaux et les Réserves du Congo Belge et du Ruanda-Urundi. By Prof. Dr. W. Robyns. Institut Royal Colonial Belge, No. 43, 1948. 1 Map, 10 pp. Price 130 fr. Les territoires phytogeographiques du Congo Belge et du Ruanda-Urundi. By Prof. Dr. W. Robyns. Institut Royal Colonial Belge, No. 410. 1, 1948. 1 Map, 10 pp. Price 130 fr.

Adaption and Origin in the Plant World.* — Despite the title of this work its subject matter sheds little light on the part played by environment in evolution, indeed the conditions of experimentation with clones of the same individual obviously exclude any selective action of the environment as between strains within a species. The text and in particular the excellent and numerous illustrations are chiefly concerned with the effect on different species of cultivating them at varying altitudes in transplant gardens and in various types of soil in various types of illumination and moisture and in different densities. Whilst it is obvious that this is a record of considerable labour these pages do not take us much further than the classical experiments of Bonnier despite the greater elaboration of technique. Data as to light conditions, temperature, soil moisture, et. cet. are furnished, but it is difficult to obtain anything approaching a sufficient picture of the relevant conditions in any particular experiment to assess adequately its real significance. No doubt this is largely due to the posthumous character of this record which Mrs. Clements had to compile from such data as were available.

E.J.S.

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*Adaptation and Origin in the Plant World, the Role of Environment in Evolution, by F. E. Clements, E. V. Martin, and F. L. Long. Chronica Botanica Co., Waltham, Mass. and Wm. Dawson & Sons, London. $6.00.

PRELIMINARY REPORT ON COLLECTIONS OF THE LARGER FUNGI MADE BY THE ASSISTANT MYCOLOGIST IN TRINIDAD B.W.I. DURING THE AUTUMN 1949.

As a result of a request from Imperial College of Tropical Agriculture the assistant mycologist made collections of fungi, principally Agarics and Discomycetes, in Trinidad during the latter part of the wet season 1949, viz from 20th September to 4th December, excluding the week 15th-21st November, spent in Venezuela.

Studies of these groups of fungi in the West Indies have hitherto been made only by Berkeley and Patouillard, who worked only from ill-preserved dried material, and by Murrill, who studied them in the field but published only incomplete diagnoses which have proved quite inadequate for recognition of his species by subsequent workers. During the visit now reported approximately 600 collections were made in Trinidad and opportunity was taken of the laboratory facilities at the Agricultural College to make water colour drawings of all the species represented, with accompanying notes of essential microscopic and ephemeral characters. A further 100 collections were made in Venezuela and on the return voyage via Jamaica opportunity was taken of revisiting several of Murrill's localities in that island and of securing another 200 collections i.e., approximately 900 collections in all. At the request of other members of the herbarium staff some time was also devoted to collecting 40 marine algae from Trinidad, and 82 packets of fern spores to supplement the collection of living ferns at Kew.

A list of localities sampled is given in table 1, with approximate altitudes and the type of vegetation at each, according to the classification elaborated by Beard, 1946.

Preliminary Conclusions.

1. As a result of these collections adequate descriptions can now be drawn up of about 310 Agaric species occurring in Trinidad, belonging to about 44 genera. Although the Agaric flora is thus rich in species they mostly occurred singly or in small numbers and were rather inconspicuous, in few did the pileus exceed 1 inch in diameter. There is a strking contrast with the large numbers of a few conspicuous species which characterise temperate forests in the Agaric season.

2. In Trinidad, where the highest peaks only slightly exceed 3000 feet, there was no indication of a zoning of fungi according to altitude above sea level. Nor was there any indication of an infiltration of temperate species at the higher altitudes. In Jamaica, on the contrary, a rich Agaric flora of temperate facies was found in the forests of the Blue Mountains between 5000′ and 7000′. Here occurred 4 species of *Cortinarius*, 3 of *Inocybe* and 1 of *Boletus*, genera not represented in Trinidad.

3. Remarkably few Discomycetes, especially inoperculate species, were found in Trinidad. The temperate Agaric flora of the Blue Mountains, however, was accompanied by an abundant Discomycete flora rich in inoperculate species.

4. Several large and conspicuous species familiar to the local mycologists at the beginning of the rainy season in June were not seen in Trinidad during the autumn. It appears therefore that there is some seasonal variation in the Agaric flora. It may tentatively be suggested that this may be correlated with the rapid leaching of nitrogen from Trinidad soils known to occur during the rains. Almost all the savanna Agarics seem to belong to this group confined to the early rains.

5. Although the same genera occur in the western tropics as in temperate forests their relative proportions are very different. In Table 2 is set out the number of species in each genus found in Trinidad and the percentage of the known Agaric flora represented by each of the larger genera. In the 3rd and 4th columns appear the corresponding percentages in the British Agaric flora and in that met with about 5000′ up in the Blue Mountains of Jamaica. Attention may be drawn to the high proportion of tough textured species (*Marasmius* and allies 24·3%) in the tropical flora and the absence or reduction in the large fleshy genera egs. *Amanita*, *Tricholoma*, *Clitocybe*, *Lactarius*, *Russula*, *Pholiota*, *Cortinarius* and *Inocybe*. The prominence of *Lepiota* and *Hygrophorus* agrees with what is known of the prevalence of these genera in the eastern tropics.

6. Preliminary comparison of the species of *Marasmius* and allies with those recently well described and figured from Ceylon by Petch (1947) indicates very few species common to the two areas.

7. The absence of the mycorrhiza-forming genera *Cortinarius* and *Boletus* from Trinidad seems to be related to the absence of the ectotrophic type of mycorrhiza in Trinidad forest trees.

8. Of the Trinidad Agarics a remarkably high proportion, almost exactly 66%, grew on wood or on debris in the early stages of decomposition and only 33% on the ground or thoroughly disintegrated humus.

9. Probably to be correlated with absence of mycorrhiza was the absence of any indication of a constant association of terrestrial species with any particular forest tree.

10. The well known parasite of Coffee, *Omphalia flavida* was found parasitising native plants in virgin rain forest in both Trinidad and Jamaica. The fungus is evidently native to both islands and reservoirs of infection for coffee may be expected to occur in the native rain forests throughout the West Indies. The Cacao parasite, *Marasmius perniciosus* was not observed on any other host. The dangerous root parasites *Clitocybe tabescens* and *Armillaria mellea* appear to be unknown in Trinidad.

Table 1. *Localities sampled and types of Vegetation.*

Locality	*Altitude*	*Dates Visited*	*Type of Vegetation.*
Trinidad			
Northern range N. of Arima	2000′	25.IX ; 4.XII	Lower Montane Rain Forest
Naranja	2000′	2.X ; 27.XI	Lower Montane Rain Forest
El Tucuche	2000–3000′	2.X	Montane Rain Forest
Aripo	1500–2500′	23.X	Montane Rain Forest
Upper Caura Valley	1000′	13.XI., 27.XI	Lower Montane Rain Forest
Morne Bleu	2000–2700′	4.XII	Lower Montane Rain Forest
Maqueripe trail	500–700′	24.XI ; 29.IX ; 27.X	Secondary Rain Forest
Diego Martin	150′	22.IX ; 24.IX	Cacao Plantations
Santa Cruz	400′	26.X	Cacao Plantations
Non Pareil, Sangre Grande	100–500′	11.X ; 19.X	Cacao and Hevea Plantations
L'orange, Aripo Valley	600′	13.X	Plantations
Matura Reserve	100′	16.X	Evergreen Seasonal Forest Mora type
Arena	100′	5.X ; 30.X ; 1.XII	Evergreen Seasonal Forest
Erin	50–200′	6.XI	Evergreen Seasonal Forest
Siparia	100′	3.XI ; 5.XI	Semi-Evergreen Seasonal Forest
Quinam	0–100′	4.XI	Semi-Evergreen Seasonal Forest
Mt. Tabor	1000–1500′	13.XI ; 27.XI	Degraded Deciduous Seasonal Forest
Cocal	0′	22.IX	Coconut Plantations
St. Augustine	50′		Banana Plantations and Gardens
,,	,,		Savanna
Tacarigua	50′		,,

Locality.	*Altitude.*	*Dates Visited.*	*Type of Vegetation.*
Port of Spain	25–100′	9.XI ; 11.XI ; 25.XI	Savanna and Botanic Gardens
St. Joseph	25′	20, 21, 25, 27 IX. 7, 14, 18, 20 X. 10, 30 XI.	Bamboo Plantation
Tobago			
Hermitage	800–2000′		Lower Montane Rain Forest
Mt. Dillon	1000–1500′		Shifting Cultivation
Venezuela			
Caracas	3000′	15.XI	Botanic Garden
Rio Chacaito	3000′	18.XI	Thin Seasonal Forest
El Junquite	6000′	16.XI	Cloud Forest
Rancho Grande, Maracay	3000–4000′	19–20.XI	Montane Rain Forest
Jamaica			
Castleton	500′		Botanic Garden
Long Mountain	600–900′		Acacia-Haematoxylon Coppice
Quickstep	1200′		Seasonal Forest
Hermitage	1700′		Reservoir Grounds
Cinchona	5000–6700′		Pine Forest, Secondary Rain Forest and Elfin Woodland

Table 2. *Genera of Agaricaceae represented in Trinidad.*

Genus	*No. of species seen*	*% of total*	*Corresponding Great Britain*	*% in flora of : Blue Mountansi Jamaica*
Amanita	1	0·3	1·3	—
Lepiota	37	11·8	4·7	—
Armillaria	1	0·3	0·2	—
Tricholoma	6	2·0	5·4	2·0
Ripartites	1	0·3	0·1	—
Rhodopaxillus	1	0·3	0·6	—
Clitocybe	2	0·6	4·1	—

Genus	*No. of species seen*	*% of total*		*Corresponding Great Britain*		*% in flora of : Blue Mountains Jamaica*	
Heimomyces	1	0·3		0		—	
Collybia	40	12·8		5·2		20·0	
Marasmius	25	8·0	24·3 %	0·6	5·9%	2·0	22%
Crinipellis	5	1·5		0·1		0	
Dictyoploca	6	2·0		0		0	
Mycena	17	5·8		5·0		8·0	
Omphalia	10	3·2		3·5		6·0	
Pleurotus	8	2·5		2·1		4·0	
Panus	4	1·2		0·3		2·0	
Hygrophorus	20	6·4		5·0		10·0	
Lentinus	4	1·2		0·5		—	
Laccaria	1	0·3		0·5		2·0	
Cantharellus	1	0·3		0·6		—	
Lactarius	2	0·6		4·0		—	
Russula	3	1·0		5·4		2·0	
Dictyopanus	1	0·3		0		2·0	
Arrhenia	1	0·3		0		—	
Favolaschia	2	0·6		0		2·0	
Volvaria	3	1·0		0·9		—	
Pluteus	6	2·0		2·0		2·0	
Rhodophyllus	19	6·0		5·2		4·0	
Claudopus	1	0·3		0·2		—	
Flammula	2	0·6		2·0		—	
Pholiota	2	0·6		2·3		4·0	
Galera	6	2·0		1·5		4·0	
Naucoria	4	1·2		2·1		—	
Tubaria	2	0·6		0·7		—	
Crepidotus	2	0·6		0·7		—	
Bolbitius	1	0·3		0·2		—	
Cortinarius	0	0		14·0		8·0	
Inocybe	0	0		5·0		6·0	
Agaricus	12	3·9		2·0		4·0	
Panaeolus	4	1·2		0·5		—	
Hypholoma	1	0·3		1·1		—	
Psilocybe	3	1·0		1·5		6·0	
Psathyrella	12	3·9		1·7		—	
Stropharia	1	0·3		1·5		—	
Melanotus	1	0·3		0		2·0	
Coprinus	12	3·9		3·3		2·0	
Boletus	0	0		3·3		2·0	

NEW FUNGI.

R. W. G. Dennis.

A Smut on Elytrophorus.

Tilletia elytrophori *Dennis*, sp. nov. Soris ovariicolis, 2–3 mm. longis, membrana cinereo-fusca vestitis. Sporis globosis vel subglobosis, fusco-brunneis, 23–26 × 23μ, episporio reticulato, hyalino, 5μ crasso.
Hab. in ovariis Elytrophori africani.

Typus : in Herb. Kew. ex *R. H. Hornby* 2979, Poole, Hartley District, Southern Rhodesia, 15.V. 1948.

Inoperculate Discomycetes from Sierra Leone.

Unguiculella caespitosa *Dennis*, sp. nov. Apotheciis erumpentibus, gregariis et hinc inde pluribus contiguis, scutellatis, 0.4 mm. diam., late sessilibus ; disco plano, hyalino ; excipulo prosenchymatico, e cellulis hyalinis rectangularibus tenuiter tunicatis circa 4–5 × 2μ composito, externe piloso ; pilis numerosis, hyalinis, e basi bulbosa, filiformibus, continuis, acutis, apice recurvatis, c. 20 × 2–3μ. Ascis clavatis, apice rotundatis, octosporis, 20–25 × 5–6μ ; sporidiis distichis, oblongis, hyalinis, 3–5× 2μ ; paraphysibus filiformibus 1μ crassis.
Hab. in ramulis emortuis Theobromae cacao.

Typus ; Njala, Sierra Leone 4.X.1949, *F. C. Deighton* M3179F, in Herb. Kew. This fungus seems allied to *U. aggregata* (Feltg.) von Höhn. but has smaller asci and spores. It lacks the hooked paraphyses of some *Unguicullela* species and in this approaches *Hyaloscypha* sensu Nannfeldt. It is, however, doubtful if Nannfeldt's interpretation of *Hyaloscypha* can be sustained as it excludes both the foundation species of the genus.

Pezolepis naucleae *Dennis*, sp. nov. Ascomatibus erumpentibus, gregariis, amphigenis, scutellatis, sessilibus, disco convexo, ochraceo, 0.2–0.4 mm. diam. ; excipulo parenchymatico, fuscidulo ; hypothecio hyalino ; ascis clavatis, octosporis, 80–100 × 15–17μ ; sporidiis distichis, oblongis, hyalinis, continuis, 18–13 × 6–7μ ; paraphysibus filiformibus, apicem versus ramosis, conglutinatis, epithecium flavidulum formantibus.
Hab. in foliis vivis Naucleae.

Typus : Sierra Leone 23.XI.1949, *F. C. Deighton* M3351, in Herb. Kew. Superficially this interesting species closely resembles a *Pseudopeziza* but the gelatinized hymenium and coloured epithecium are unlike features of that genus. The " excipulum ", which forms a denticulate, dark brown margin to mature fructifications, seems to arise as a disc of brown, parenchymatous cells within the host epidermis overlying the young hymenium. The structure is thus somewhat Hemisphaeriaceous and the fungus seems to be a pseudo-discomycete.

KARSTEN'S SPECIES OF MOLLISIA.

R. W. G. Dennis

The type material of any species is necessarily limited and that of fungi described by the nineteenth century mycologists is usually extremely scanty. As each examination of the type of a microscopic fungus usually involves making a mount there is often a danger of the type being eventually completely destroyed. Hence it is important that anyone who re-examines types of microscopic fungi should place on record any observations complementary to those in the original diagnosis.

The writer has recently had occasion to re-examine critically the types of those species of Mollisia described by Karsten in Mycologia Fennica. P. A. Karsten's work is remarkable for its reliability and accuracy, especially in his microscopic measurements but it is not surprising that he omitted from his diagnoses characters which a further 80 years of research have shown to be essential. It should be noted that the colours of apothecia quoted in the following descriptions are those of type material now mostly at least 80 years old. As regards colour Karsten's original diagnoses will probably be found more helpful by the mycologist trying to identify fresh collections. For example, the apothecia of *Mollisia hydrophila* (Karst.) Sacc. in Fung. Fenn. 643 may now fairly be described as yellow ochre ; Karsten described them when fresh as " tota albida vel albido-pallentia, interdum sordide albida vel cinerescentia sicca (extus) colore immutata aut fusca vel fuscescentia ". In the writer's opinion much stress should not be laid on small colour differences between old collections of these soft-fleshed fungi.

The following descriptions are arranged under the numbers allotted to the species in Mycologia Fennica Vol. I, 1871, which is probably the most generally accessible of Karsten's works, though it does not contain his final opinion of their systematic position. Numbers not quoted below were assigned by Karsten to species originally described by other authors, the types of which are not, therefore, in his herbarium at Helsinki.

All details in the descriptions have been obtained from the same apothecium, from which both freezing microtome sections and crush preparations have usually been studied.

Though several of the species described below are clearly referable to genera other than *Mollisia* the writer believes it undesirable to publish formal recombinations in those genera until the types of more of the very large number of small inoperculate discomycetes described prior to 1869 have been restudied. Until this has been done one can feel no confidence that the epithets selected by Karsten will not be reduced to synonymy.

1. **Mollisia ramealis** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 187 (1871).

   Peziza (*Nodularia*) *ramealis* Karst. in Not. Sallsk. Fauna Flora Fennica **10,** 155 (1869).

Apothecia gregarious, sessile, erumpent from between the bark and wood of small dead branches. Disc about 1 mm. across, flat, becoming slightly convex when moist, burnt sienna when dry, brighter and yellower when fresh yielding a sulphur yellow solution in 10 per cent. KOH. Receptacle dark brown, paler at the margin, downy, irregularly cupshaped

and seated on a broad base. Flesh white, of hyaline, loosely interwoven, rather thin-walled hyphae about 3μ wide, becoming parallel and radially arranged towards the outside. Excipulum brown, of more or less spherical, thin-walled, isodiametric cells, about 8–10μ across, those towards the margin more elongated and arranged in rows, clothed throughout with cylindrical thin-walled, hyaline 0–1 septate hairs, up to about 30×4μ. Asci cylindric-clavate, indistinctly stalked, apically narrowed to the small pore, which stains deep blue in Melzer's reagent, 75–100×7–8μ, 8-spored. Ascospores biseriate, fusiform, straight or slightly curved, 21–27×2–2·5μ, according to Karsten " 14–30×2–3μ, spurie tenuiter uniseptatae ". Paraphyses cylindrical or slightly enlarged upwards, then rather sharply narrowed to an almost pointed tip, 3–4μ broad, not longer than the asci. (Fig. 1). On bark of dead twigs of *Betula*.

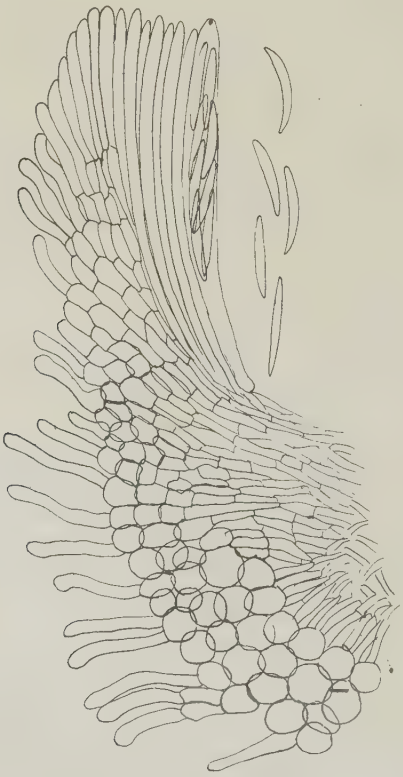


Fig. 1. *Mollisia ramealis*. Section through apothecial margin and 5 free ascospores ×500.

There are three collections in Herb. Karsten, dated respectively 22 Oct. 1866, 18 Sept. 1868 and 27 July 1869. The above description is drawn up from the first of these but all are evidently conspecific though the second shows considerable variation in colour of the disc.

As pointed out by Karsten in Hedwigia 1892 p. 298 this is not the fungus described by Rehm as *Niptera ramealis* (Karst.) Karst. and subsequently renamed *Niptera ramincola* Rehm. Karsten's fungus described

above appears to be very near or perhaps identical with *Helotiella citrinella* Sacc. but its systematic position is a matter of some difficulty. It is not a typical *Mollisia* and in its erumpent habit and excipular structure it recalls some Scleroderridoideae. In 1869 Karsten erected for it a monotypic subgenus of *Peziza*, *Nodularia*, but this cannot be raised to generic rank as the name is already preoccupied. Possibly *Helotiella* Sacc. may be the place for *M. ramealis* but I have not yet seen the type of that genus, which was also unknown to Nannfeldt (1932) who suggested that *M. ramealis* had affinities with *Orbiliopsis*. That suggestion unfortunately is not very helpful as the place of *Orbiliopsis* itself in Nannfeldt's system is somewhat uncertain. There are at Kew the following British collections of *M. ramealis* both on *Betula* :—

Kinnoull Hill, Perth, A. M. Rogers, 30. VIII, 1911.

Netley Heath, Surrey, 6. VI. 1948.

2. **Mollisia ventosa** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 188 (1871).
Peziza ventosa Karst. in Not. Sallsk. Fauna Flora Fennica **10,** 157 (1869).

Apothecia gregarious, often in small clusters, superficial. Disc grey, concave or flat with a well defined rim, with a distinct yellowish tint when moist, the large apothecia irregularly lobed up to 2 mm. across. Receptacle saucer-like, with a broad base, black with a paler margin and somewhat ribbed when dry, watery grey when moist, smooth throughout. Flesh white, of small hyaline, angular cells, passing radially into radiating parallel hyphae forming the excipulum,the outermost cells broad with rounded ends and thin dark-brown walls. Over most of the receptacle this outer zone of dark cells is only 1–2 cells thick and towards the margin it is entirely lacking. Asci very long cylindric-clavate, with slender stalks and narrowed apices, the pore deep blue in Melzer's reagent, 90–120×6–7μ, 8-spored. Ascospores mainly uniseriate, fusiform, straight or slightly curved, 1-septate, 10–15×2–3μ (10–20×2–3·5μ and up to 3 septate according to Karsten). Paraphyses slender cylindrical, about 1μ thick, not exceeding the asci. The description is based on Fungi Fennici 733, on bare wood of *Salix* in June. Structurally this species is closely allied to *Belonopsis excelsior*.

3. **Mollisia caespiticia** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 189 (1871).
Peziza caespiticia Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 159 (1869).

Apothecia erumpent from bark in small dense clusters, sometimes (? always) seated on the clustered ostioles of an immersed Pyrenomycete, often deformed by mutual pressure. Disc dark grey, up to 1·5 mm. across, usually irregular, concave when dry, flat or slightly convex when moist. Receptacle drab coloured, smooth, obconical. Flesh white, of thinwalled, small, angular, hyaline cells. Excipulum thick, of more or less isodiametric cells about 8–12μ broad, with thin brown walls, sometimes running out at the surface into short hyaline, obtuse, thinwalled hairs. Asci cylindric-clavate, not distinctly stalked, rounded above, the pore *not* blue in Melzer's reagent, 30–40×3–4·5μ, 8-spored. Ascospores narrowly fusiform or rounded at one end and pointed at the other, straight or very slightly curved, 4–7×1μ. Paraphyses not seen.

No type collection was specified in the diagnosis which states : " Supra corticem *Salicum* et *Ribis rubri*, prope Mustiala mensibus Majo, Septembri et Octobri observata, *Sphaerias* libenter incrustat ". The three collections in Herb. Karsten do not precisely correspond with this as all were made in October viz:—ad Ribes rub. 22 Oct. 1868 ; ad Sambuci 28 Oct. 1868 and on unnamed host 2 Oct. 1867, Ml (=Mustiala). The last named bears Karsten's notes and sketches and is that redescribed above. An English collection was published in The Naturalist 833, 76, (1950.)

4.* **Mollisia cinerea** (*Batsch*) *Karst.** **epibrya** (Karst.) Karst., Mycol. Fenn. **1,** 190 (1871).

Peziza epibrya Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 159 (1869).

Apothecia scattered, appearing superficial. Disc dark grey, concave when dry, flat with a low rim when moist, up to 750μ across. Receptacle cupshaped, often drying triangular, narrowed to a short stem-like base about 150μ across embedded in the moss tissue, smooth, sooty-brown. Flesh of very fine hyaline hyphae. Excipulum of parallel hyphae with very dark brown walls, lying at an acute angle to the surface, then curving upwards and lying almost vertically towards the margin, 2–3μ thick. (Fig. 2). Asci cylindric-clavate, short-stalked, rounded above with a small pore deep blue in Melzer's reagent, 60–70×7–8μ, 8-spored. Ascospores elliptic-clavate, often somewhat pointed at the lower end, 7–10×3–4μ. Paraphyses filiform about 1.5μ thick.

Fig. 2. *Mollisia epibrya.* Apothecium in vertical section×50. Section through apothecial margin, ascus, paraphysis and spores×500.

Type on moss Mustiala, Finland, 8 Oct. 1867. Moss cells surrounding the base of the apothecium are packed with the brown mycelium of the fungus, the hyphae about 4μ wide.

This is evidently a *Durella* and bears no anatomical resemblance to *M. cinerea.*

4.** **Mollisia cinerea** (*Batsch*) *Karst.*** **Mollisia fallens** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 191 (1871).

Trochila fallens Karst. in Not. Sallsk. Fauna Flora Fenn. **11** p. 217, (1870).

Mollisia fallens (Karst.) Sacc., Syll. Fung. **8** p. 332, (1889).

Apothecia scattered or in small groups, superficial. Disc grey-brown, up to 600μ across, concave when dry, flat with a distinct rim when moist. Receptacle cupshaped with a narrow base, blackish with a narrow almost white margin, smooth below, minutely downy above. Flesh white, of compact, hyaline, thinwalled, angular cells. Excipulum dark olive-brown, of isodiometric, somewhat angular cells with thin dark walls, the outermost rounded and, towards the margin, bearing short, brown, clavate thin-walled hairs about 10–15×4–5μ. The marginal cells are hyaline. Asci cylindric-clavate, indistinctly stalked, rounded above, the pore *not* stained blue in Melzer's reagent, 50–60×7–9μ, 8-spored. Ascospores biseriate, elliptic-cylindric, straight, 9–14×3–4·5μ. Paraphyses cylindrical or slightly enlarged upwards to the rounded apex, scanty, not longer than the asci.

There are three collections in Herb. Karsten, all on *Salix* bark, viz. 16 May 1868, 22 Oct. 1868 and 26 Oct. 1868, the second is that described above.

5. **Mollisia perparvula** (*Karst.*) *Karst.*, Mycol. Fenn **10,** 191 (1871).

Peziza perparvula Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 162 (1869).

Apothecia scattered, superficial. Disc concave, becoming almost flat when moist, up to 500μ across, drab coloured. Receptacle cup-shaped with a narrow base, smooth below but with a few brown basal hyphae anchoring it to the bark, minutely downy above, dark brown with a conspicuous paler margin. Flesh white, of compact, tightly interwoven, thinwalled, hyaline hyphae. Excipulum of more or less isodiametric cells up to 15μ across, with thin dark brown walls, occasionally, especially towards the upper part of the receptacle, running out into short, clavate, thinwalled hairs ; marginal cells narrower, paler, more rectangular and arranged in vertical series. Asci cylindric-clavate rounded above, the pore *not* stained blue in Melzer's reagent, 60–70×6–8μ, 8-spored. Ascospores biseriate, narrowly elliptical, straight, nonseptate, 7–12×2–3μ. Paraphyses cylindrical, not longer than the asci, about 2·5μ wide, rounded above. Type on bark of *Tilia*, Merimasku, Finland, August 1860.

6. **Mollisia complicata** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 192 (1871).

Peziza complicata Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 192 (1869).

Peziza cinerea Batsch lividula Nyl.* in Not. Sallsk. Fauna Flora Fenn. **10,** 61 (1869).

Apothecia scattered, superficial. Disc fuscous, concave with a prominent slightly incurved rim, up to 1 mm. across. Receptacle dark grey, cupshaped, seated on a very short, broad, stem-like base, smooth, texture when moist soft and elastic. Flesh of thin-walled, hyaline, interwoven hyphae. Excipulum about 40μ thick, sharply differentiated from the flesh, composed of parallel hyphae lying at a high angle to the surface except near the margin of the receptacle, where they tend to turn upwards parallel with the surface. Hyphae with thick, hyaline walls and thin septa, tinged slightly brown towards the surface, their ends sometimes protruding and thin-walled. Asci cylindric-clavate, almost sessile, rounded above, the pore *not* blue in Melzer's reagent, 50–65 × 5–7μ, 8-spored. Ascospores biseriate, cylindrical or slightly curved with each end rounded, often 1-septate, 10–12 × 2–2·5μ. Paraphyses cylindrical, slightly enlarged to 3μ towards their rounded tips, not longer than the asci (Fig. 3).

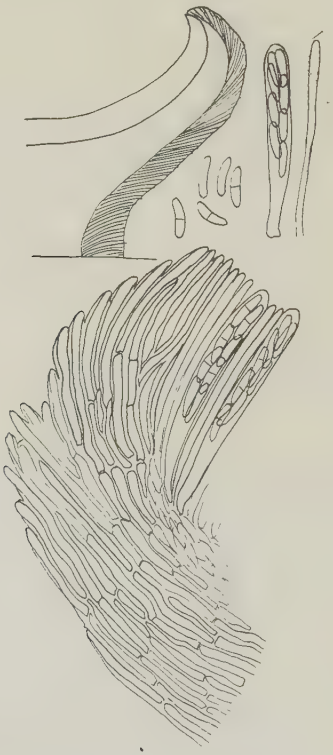


Fig. 3. *Mollisia complicata*. Half apothecium in vertical section × 50. Section through apothecial margin, ascus, paraphysis and spores × 500.

Type in Herb. Karsten on cut surface of a branch of *Salix caprea*, in Botanical Garden, Helsinki, W. Nylander, 5 Feb. 1863, first labelled *Peziza lividula* Nylander, later corrected to *Mollisia complicata* Karst.

This fungus is evidently an *Allophylaria* Karst. sensu Nannfeldt 1932 (= *Pezizella* Fuckel emend. von. Höhnel) and should be compared with *Peziza concolor* Phill. It is noteworthy that both Nylander and Karsten described the excipulum as composed of filaments adhering together and

trending towards the margin, the surface subfurfuraceous with crystals of calcium oxalate. These were no longer apparent on the apothecium studied but are characteristic of some species of *Allophylaria*, such as *P. concolor* Phill. and *P. straminea* Berk. & Br., on which they are evidently excreted by the thin-walled tips of the excipular hyphae. The present species is in no way related to *Mollisia sublividula* sensu Karst.

6.***Mollisia complicata** (*Karst.*) *Karst.** **Mollisia sublividula** (*Nyl.*) *Karst.*, Mycol. Fenn. **1,** 193 (1871).

Peziza sublividula Nyl. in Not. Sallsk. Fauna Flora Fenn. **10,** 61 (1869).

Mollisia sublividula (Nyl.) Sacc., Syll. Fung. **8,** 341 (1889).

Apothecia scattered, superficial or with a short peg-like base inserted in decorticated wood. Disc grey brown, concave, flattened when moist, up to 500μ across. Receptacle obconical or cupshaped, dark grey-brown, minutely downy. Flesh of the subhymenial region of small compact, thinwalled, hyaline cells. Excipulum of isodiametric or slightly radially elongated cells with thin dark brown walls about 7–12×5–8μ, running out at the surface, especially near the margin, into short, thinwalled, clavate hairs, mostly 1-septate and nearly hyaline. Asci cylindric clavate, not distinctly stalked rounded above, the pore *not* blue in Melzer's reagent 32–42×4·5–6μ.

Ascospores narrowly fusiform, 4–7×1·5μ. Paraphyses cylindrical about 2μ wide, not exceeding the asci.

This species was described very briefly by Nylander in a footnote to his Observationes circa Pezizas Fenniae and was based on a collection " In Gallia ad ligna vetusta ". It was also said to occur in England, for Nylander added " etiam in Anglia (unde misit rev. Bloxam nomine P. cinerea "), a record which appears to have been overlooked by compilers of lists of British Discomycetes. Karsten's collection here redescribed is therefore of no authority for the name as it is on wood of *Alnus*, Mustiala, Finland 6.XII.1868. The other collection on *Prunus* cited inMycologia Fennica has also been preserved but bears no notes beyond measurements of asci and spores. No collection from Bloxam certainly identifiable with that cited by Nylander can yet be identified at Kew.

It has seemed worth while to describe Karsten's material here because it was in this sense that the name *Mollisia sublividula* was taken up by Saccardo. It is, however, obviously highly desirable that search be made for Nylander's type.

7. **Mollisia sordidula** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 193 (1871).
Peziza sordidula Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 170 (1869).

Apothecia scattered, superficial. Disc vandyke brown and concave when dry, ochraceous tawny and flat with a low rim when moist, up to 300μ across. Receptacle cupshaped, vandyke brown, paler at the margin, smooth, the base sometimes slightly inserted in the substrate. Flesh a small-celled hyaline pseudoparenchyma. Excipulum hyaline throughout, of similar but larger cells, isodiometric about 5μ across below, more elongated on the flanks of the receptacle and replaced at the margin by vertical parallel hyphae about 5μ broad. Asci cylindric-clavate, scarcely

stalked, pointed above, the pore deep blue in Melzer's reagent, 65-75 × 8–10μ, 8-spored. Ascospores irregularly arranged, fusiform or inequilateral, often slightly curved, 3-septate, 18-20 (–25 Karsten) × 3–4μ. Paraphyses very slender, about 1μ thick. (Fig. 4).

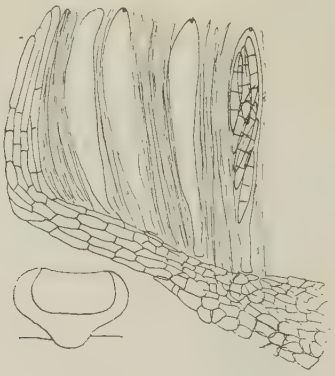


Fig. 4. *Mollisia sordidula*. Vertical section of apothecium × 50. Section through apothecial margin × 500.

The above description is based on Fungi Fenn. 751 on decorticated wood of *Pinus sylvestris*. This fungus is an *Orbiliopsis*.

8. **Mollisia emergens** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 194 (1871).
Stictis emergens Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 254 (1870).

This is a typical *Hysteropezizella* and has been transferred to that genus by Nannfeldt (1932 p. 115).

9. **Mollisia luzulina** *Karst.*, Mycol. Fenn. **1,** 194 (1871).
Naevia luzulina (Karst.) Karst. in Acta Soc. Fauna Flora Fenn. **2** (6), 168 (1885).
Phragmonaevia luzulina (Karst.) Rehm in Rabenh. Krypt. Flora **1** (3), 163 (1888).

Apothecia immersed, scattered, each surrounded by a dark brown rim of dead host cells and ring of loose cuticle, sometimes split into lobes. Disc flat, cinnamon buff, up to 300μ across, with a prominent concolorous rim. Receptacle saucershaped with a broad base, seated on the host mesophyll and enclosed by the upturned edges of the torn epidermis, smooth. Excipulum of thin-walled rectangular cells in layers parallel to the surface, those at the margin about 7–15 × 4μ. Asci cylindric-clavate, sessile, somewhat pointed above, the pore not usually blue in Melzer's reagent, though a few appear to show a minute apical blue spot, 40–50 × 4–5μ. Spores biseriate, fusiform or somewhat clavate, 8–15 × 1·5–2μ. Paraphyses cylindrical 1·5μ thick.

Type in dead leaves of *Luzula pilosa* Vasa, 22 July 1867. Nannfeldt (1932) cited this fungus among those probably to be transferred to *Laetinaevia* Nannf. This suggestion would seem to be well founded. According to Nannfeldt (Svensk. Bot. Tidskr. XXII p. 133, 1928) the species is common on leaves of Luzula spp. throughout Scandinavia.

10. **Mollisia pteridina** (*Nyl.*) *Karst.*, Mycol. Fenn. **1,** 194 (1871).
Peziza pteridina Nyl. in Not. Sallsk. Fauna Flora Fenn. **10,** 58 (1869).

Apothecia scattered, superficial. Disc concave, brown when dry, buff when moist, up to 400μ across. Receptacle cupshaped with incurved margin when dry, opening and splitting to give a crenate margin when moist, seated on a broad base, smooth. Flesh in the hypothecium of fine interwoven hyphae, in the base of the receptacle of thinwalled, isodiametric, hyaline cells. Excipulum of thinwalled, almost hyaline rectangular cells about 6–10×4μ, in rows parallel to the surface. Asci cylindric-clavate, almost sessile, rounded above, the small pore blue in Melzer's reagent, 35–45×4–6μ, 8-spored. Ascospores biseriate, fusiform or slightly clavate, 5–10×1–2μ. Paraphyses cylindrical or slightly enlarged upwards, rounded at the apex, about 2μ broad, not exceeding the asci (Fig. 5).

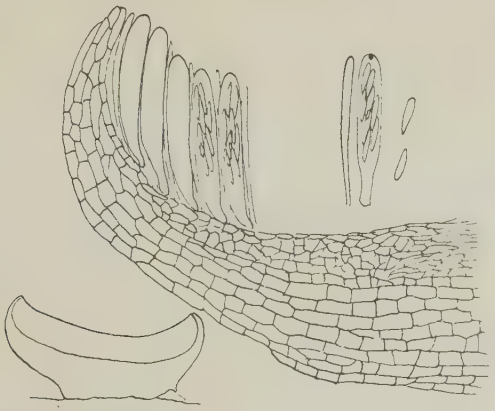


Fig. 5. *Mollisia pteridina.* Vertical section of apothecium×50. Section through apothecial margin, ascus, paraphysis and spores×500.

On dead stem of *Pteridium aquilinum.* Specimen examined in Herb. Karst., Merimasku, Finland, undated but bearing full notes and sketches of microscopic details on the packet. Though the species was named by Nylander, Karsten's material may be accepted as authentic, for Nylander was renaming a fungus misdetermined by Karsten as *Peziza pteridis* A. & S. and cited as the type "ad stipites vetustos *Pteridis aquilinae* in Merimasku, regionis Aboensis, vere (P. A. Karsten)".

Structurally this is not a typical *Mollisia* but it somewhat resembles *Peziza cornea* Berk. & Br. transferred to *Mollisia* by von Höhnel and may provisionally be retained in that genus.

11.* **Mollisia palustris** (*Rob.*) *Karst.** **hydrophila** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 196 (1871).

Peziza hydrophila Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 163 (1869).

Mollisia hydrophila (Karst.) Sacc., Syll. Fung. **8,** 345 (1889).

Apothecia scattered, superficial, Disc when dry yellow-ochre, flat with a low rim, when moist grayer, slightly convex without a rim, up to 1 mm. across. Receptacle saucershaped sessile on a small base, brown,

smooth. Flesh of loosely woven hyaline, slender hyphae about 2μ thick, radially arranged as they approach the excipulum. Excipulum of 2–3 layers of almost isodiametric, thinwalled cells, the inner almost hyaline, the outer in the lower part of the receptacle with thin brown walls, about 6–8μ across. Asci cylindric-clavate with short, ill-defined stalks, narrowed above to the small pore deep blue in Melzer's reagent, 8-spored, about 50×5–6μ, up to 70×7μ according to Karsten. Ascospores biseriate, fusiform, 8–13×1·5–2·5μ, nonseptate, straight. Paraphyses cylindrical or slightly enlarged below the tip, about 2–2·5μ thick. On dead culms of *Phragmites communis*, description based on Fung. Fenn. 643.

11.** **Mollisia palustris** (*Rob.*) *Karst.*** **simillima** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 196 (1871).

Peziza hydrophila Karst.* *Peziza simillima* Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 163 (1869).

Niptera palustris Rob.** *N. simillima* (Karst.) Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 247 (1870).

Apothecia scattered singly or in small groups, superficial. Disc slightly concave when dry, flat without a rim when moist, pale buff when dry, fuscous from the underlying dark excipulum when wet, up to 800μ across. Receptacle shallow saucershaped with a broad base, dark brown, smooth. Hypothecium of slender interwoven hyphae about 2μ thick. Excipulum of more or less isodiametric cells, the inner somewhat angular hyaline and thinwalled, the outermost rounded with thin brown walls about 8–12μ across, narrower, more elongated and clavate towards the margin. On the flanks of the receptacle and beside the hymenium the inner zone of hyaline parenchyma is not developed. The apothecium rests on a thin web of hyaline subicular hyphae about 2μ wide. Asci cylindric-clavate, 50–60×5–6μ, indistinctly stalked, somewhat rounded above, the pore deep blue in Melzer's reagent, 8-spored. Ascospores biseriate fusiform or clavate, pointed at the lower end, 9–14×1–2μ. Paraphyses cylindrical or slightly enlarged upwards to 3–4μ, slightly longer than the asci. (Fig. 6).

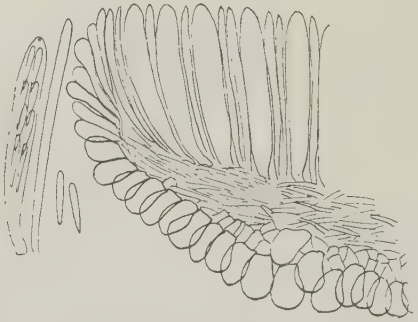


Fig. 6. *Mollisia simillima*. Section through apothecial margin, ascus, paraphysis and spores ×500.

On rotting culms of *Juncus conglomeratus*, type, Mustiala, Finland, 20 August, 1868.

Karsten was clearly unwilling to accord this fungus full specific status but the name *Mollisia simillima* Karst. was printed as that of a distinct species by Saccardo in Syll, Fung. VIII p. 347, 1889.

Authentic material of *Peziza palustris* Rob. in Herb. Berkeley has the same structure but slightly smaller asci about 40×5μ, with spores 9–11×1–2μ. There seems no reason for maintaining Karsten's fungus as even a variety of *M. palustris*. This was evidently his own opinion in later years for in Revisio atque synopsis Ascom. fenn. (Acta Soc. pro Fauna Flora Fennica II (6) p. 135, 1885) *M. palustris* is listed with a subspecies* *M. hydrophila* but *M. simillima* and *M. epitypha* have disappeared without comment.

11.*** **Mollisia palustris** (*Rob.*) *Karst.**** **epitypha** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 197 (1871).

Niptera palustris Rob.** *N. epitypha* Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 247 (1870).

Apothecia scattered or in pairs, superficial. Disc slightly concave when dry, flat or slightly convex without a rim when moist, yellowish-buff when dry, light grey when moist, up to 1 mm. across. Receptacle very dark brown, shallow saucer-shaped, seated on a broad base. Hypothecium of fine, hyaline, interwoven hyphae, remainder of the flesh of small angular cells passing inperceptably into a zone of large, hyaline, thin-walled, isodiametric cells like those of the inner part of the excipulum in *M. simillima*. Outermost layer of cells in the excipulum rounded with rather thin brown walls, about 10×8μ, narrower and more clavate towards the margin. Subicular hyphae not observed. Asci cylindric clavate, 50–60×5–6μ, 8-spored, not distinctly stalked, narrowed above to the small pore stained deep blue in Melzer's reagent. Ascospores uniseriate or irregularly biseriate, narrowly fusiform-cylindric or slightly more pointed at the lower end, 10–14×2μ. Paraphyses cylindrical, slightly enlarged upwards, about 2μ wide, septate. On rotting leaves of *Typha latifolia* ; type, Mustiala, Finland, 20 Sept. 1868.

This is clearly no more than a host form of *M. simillima* and like it should be reduced to synonymy under *M. palustris*.

This is one of the few species in which Karsten at first miscalculated his spore measurements, though he corrected the error before publication. His note on the type packet reads " 19–20–24, 3–3.5–4 ", whereas the spores are actually, as published, half this size viz. 10–14×2μ.

14. **Mollisia junciseda** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 198 (1871).
Peziza junciseda Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 164 (1869).

Apothecia scattered, superficial. Disc buff, flat with a shallow rim when dry, slightly convex without a rim and grey, at least toward the margin, when moist, up to 500μ across. Receptacle disc-like with a broad base and sides almost vertical or slightly sloping inwards to the margin, dark brown or blackish, smooth. Flesh of slender, loosely interwoven, hyaline hyphae. Excipulum of broader, hyaline hyphae radially arranged, the cells becoming isodiametric as they approach the surface. Outermost layer of more or less globose cells with thin, dark brown walls, mostly 6–10μ across, those near the margin of the receptacle somewhat

more clavate but not produced into hairs. The hymenium yields a sulphur-coloured solution in 10 per cent. KOH. Asci clavate, narrowed to a stalk below, pointed above with a small pore dark blue in Melzer's reagent, 8-spored, 60–70×8–10μ. Ascospores irregularly arranged, fusiform, 3-septate, straight or slightly curved, 19–22×2μ (20–28×2–3μ according to Karsten). Paraphyses slender, slightly enlarged upwards to about 2μ at the obtuse tip, not longer than the asci.

On decaying culms of *Juncus conglomeratus* ; type, Mustiala, Finland, 30 August 1868.

The fungus is evidently a species of *Belonopsis*.

14.* **Mollisia junciseda** (*Karst.*) *Karst.** **juncinella** (*Karst.*) *Karst.* Mycol. Fenn. **1,** 198 (1871).

Peziza junciseda Karst. **P. juncinella* Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 164 (1869).

Superficially and structurally this closely resembles the above, differing only in its larger asci (70–80×8–9μ) and spores (23–27×3–3·5μ). Type on *Juncus articulatus* according to the published diagnosis ; the packet in Herb. Karsten is labelled "M1." (=Mustiala)" ad Junc. Gerardi P.A. Karst. 30 Aug. 1868 ".

15. **Mollisia graminea** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 199 (1871).

Peziza graminea Karst., Fung. Fenn. 747.

Niptera palustris Rob.***** *N. graminea* Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 247 (1870).

Belonopsis graminea (Karst.) Sacc. & Syd., Syll. Fung. **16,** 753, (1902).

Apothecia scattered, superficial. Disc yellowish buff, flat with a low, broad pale rim when dry, slightly convex when moist, up to 1 mm. across. Receptacle saucer-shapped, on a rather narrow base, pale buff at the margin, dark brown below, smooth above but bearing numerous brown anchoring hyphae below. There is no common subiculum but each apothecium is surrounded by a narrow zone of brown radiating hyphae. Flesh of slender, interwoven, hyaline hyphae about 2μ thick. Excipulum 2–3 cells deep formed towards the margin of small, thinwalled, somewhat angular isodiametric, hyaline cells, the outermost often elongated, below of larger rounded cells, 10–15μ across, with thin brown walls, running out into the stout anchoring hyphae 3–4μ wide. Asci cylindric-clavate, indistinctly stalked, narrowed above, the pore deep blue in Melzer's reagent, 8-spored, 70–90×8–12μ. Ascospores fusiform, mostly inequilateral, 3-septate, 20–26×3μ (20–30×3–4μ Karsten). Paraphyses cylindrical, slightly enlarged upwards to 3–4μ at the obtuse apex.

What appears to be the type in Herb. Karsten is labelled :—"*Peziza junciseda* M1. ad Calamagr. (?) 27 Sept. 68 ", to which has been added "*Belonopsis graminea* (Karst.) Sacc. & Syd. This appears to be a good species of *Belonopsis*, distinct from *Mollisia junciseda*.

16. **Mollisia excelsior** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 199 (1871).
Peziza excelsior Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 165 (1869).

Belonopsis excelsior (Karst.) Rehm in Rabenh. Krypt Flora **1** (3), 572 (1896).

Apothecia scattered or in small groups, superficial. Disc up to 1–2 mm. across, flat and ochraceous buff when dry, greyer and markedly convex when moist. Receptacle concolourous with the disc at the margin, dark brown below, smooth, disc-like with a small base. Flesh of fine, interwoven, hyaline hyphae. Excipulum of similar but light brown hyphae lying parallel and radially arranged, becoming broader towards the surface, until the outermost layer consists of short, clavate, dark brown cells about 10–15 × 8μ. There are no anchoring hyphae. Asci cylindric-clavate with short stout stalk, pore deep blue in Melzer's reagent, 8-spored, 120–130 × 8–10μ. Spores lying parallel in a fascicle, cylindric-clavate, rounded at one end, pointed at the other, usually slightly curved, 3-septate at maturity, 50–80 × 3–4μ. Paraphyses cylindrical, about 1–2 wide, with greatly enlarged obtuse apices 4–7μ wide.

Type, Mustiala, on Phragmites, 11 May 1866.

It is noteworthy that this packet bears the following measurements : "Asc. 130–140–150 long. 9–10½ lat. sp. 56–80 long. 3½–2½, p. 1·5 clav. 5–6μ." These are correct but the published spore size was 42–50 × 3–4μ.

This is the type species of *Belonopsis*.

17. **Mollisia rhinanthi** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 200 (1871).

Trochila rhinanthi Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 246 (1870).

Pseudopeziza rhinanthi (Karst.) Sacc., Syll. Fung. **8,** 358 (1889).

Apothecia scattered, erumpent, seated on the xylem and surrounded by torn strips of cortical and epidermal tissue. Disc deeply concave, dark grey or nearly black, up to 1·5 mm. across. Receptacle cupshaped on a broad base, the margin incurved, angular when dry, smooth. Hypothecium thin, of slender, interwoven, hyaline hyphae. Excipulum on the flanks of the receptacle formed of 2–3 layers of dark brown, thinwalled cells, usually somewhat angular by mutual pressure, isodiametric below, more elongated and clavate towards the margin. At the base of the receptacle the inner excipular layers, sharply defined from the hypothecium, are of hyaline, thin-walled, isodiametric cells about 10μ across, while only the outermost layer is dark-walled. Asci cylindric-clavate, tapering below but not distinctly stalked, about 70 × 6–7μ, narrowed above to the small pore, which stains deep blue in Melzer's reagent, 8-spored. Ascospores 2 or even 3-seriate, clavate, rounded above with a long, tapering lower portion, 1-septate, 10–25 × 1·5–2·5μ. Paraphyses very slender, cylindrical.

Type, on dead stems of *Rhinanthus*, Mustiala, Finland, 20 July 1869.

The type collection is extremely scanty but appears to lack the black stroma characteristic of *Ephelina lugubris* (de Not.) von Höhn. on the same host. There is also in Herb. Karsten a collection labelled " Mollisia pa Rhinanthus, Mustiala, 18.5.1872 " which is evidently *Ephelina lugubris*. This has the black stroma and much shorter, clavate ascospores, about 10–12 × 3μ, often appearing 1-septate. *M. rhinanthi* may be a good

species but one would like to see more and better collections to demonstrate that it is not merely a state of *E. lugubris* developed on the upper part of the stems instead of at the crown.

18.* **Mollisia atrata** (*Pers.*) *Karst.** **M. foliicola** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 201 (1871).

Trochila atrata (Pers.) Karst.* *Tr. foliicola* Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 244 (1870).

Mollisia foliicola (Karst.) Karst. in Acta Soc. Fauna Flora Fenn. **2,** (6), 136 (1885).

Pyrenopeziza foliicola (Karst.) Sacc. Michelia I p. 65, 1877.

This species has been fully redescribed and figured by Nannfeldt. It is a good *Pyrenopeziza*, of which I have seen and compared with the type the following British collection :—On decaying leaves of *Alnus*, Llwynyworm-wood House, Llandovery, 30.IV.1948. The species may well be common on that substrate but is likely to be overlooked because of its minute size.

18.** **Mollisia atrata** (*Pers.*) *Karst.*** **M. kolaensis** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 201 (1871).

Peziza kolaensis Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 191, (1869).

Pyrenopeziza kolaensis (Karst.) Sacc., Syll. Fung. **8,** 370 (1889).

Apothecia scattered, appearing superficial but actually erumpent. Disc dark grey, deeply concave, about 300μ across. Receptacle cup-shaped with a broad base, minutely downy throughout, concolorous with a paler margin. Flesh of hyaline, rather thick-walled, closely interwoven hyphae about 3–4μ thick, continuous with a small stromatic hyphal web immersed in the substrate. There is a thin but well defined subhymenial layer of more slender, thinwalled hyphae. Excipulum of parallel hyphae 4–5μ across, lying at a low angle to the surface, with thin dark brown walls and cells about 8–10μ long. These run out into short, septate, brown hairs, those toward the margin longer, up to 35×4μ, paler, cylindrical with rounded tips, their walls covered with minute granules. Asci cylindrical, sessile, rounded above, the pore *not* blue in Melzer's reagent, 8-spored, 25–30×4–5μ. Ascospores narrowly fusiform, 5–8× 1.5μ. Paraphyses slender, cylindrical, about 1·5μ wide, not longer than the asci. (Fig. 7).

Type on bark of *Salix*, Kola, 20 July 1861.

This is evidently a species of *Cistella* in the sense of Nannfeldt (1932).

19. **Mollisia galii-veri** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 203 (1871).

Trochila atrata (Pers.) Karst.***** *Tr. galii* Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 245 (1870).

Pyrenopeziza galii-veri (Karst.) Sacc., Syll. Fung. **8,** 356 (1889).

This fungus has been redescribed and figured by Nannfeldt (1932) and is a good species of *Pyrenopeziza*.

20. **Mollisia leucostoma** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 203 (1871).

Trochila leucostoma Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 245 (1870).

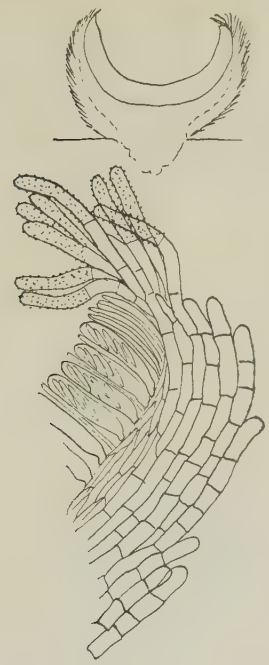


FIG. 7. *Mollisia kolaensis*. Vertical section of apothecium × 50. Section through apothecial margin × 500.

Niptera leucostoma (Karst.) Sacc., Syll. Fung. **8,** 483 (1889).

Pyrenopeziza leucostoma (Karst.) Nannf. in Nov. Act. Reg. Soc. Sci. Upsal. Ser. 4, **8,** 153 (1932).

This species has been full redescribed and figured by Nannfeldt (1932) and was justly referred by him to *Pyrenopeziza*.

22. **Mollisia thallophila** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 205 (1871).

Trochila thallophila Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 246 (1870).

Pyrenopeziza thallophila (Karst.) Sacc., Syll. Fung. **8,** 370 (1889).

Apothecia scattered, erumpent from thallus and apothecia of *Lecanora subfusca*. Disc concave, black, with inrolled margin, up to 400μ across. Receptacle cupshaped, very dark grey, ridged and furrowed vertically when dry, margin paler and often lobed, seated on a small peg-like base inserted in the lichen tissue. Flesh thin, of compact, slender, hyaline hyphae. Excipulum 2–3 cells thick, of thin-walled, more or less rounded brown cells, 6–8μ across, turning deep red-brown in Melzer's reagent, running out into unicellular, onion-shaped hairs, 15–20μ long × 5μ at the base, especially numerous near the margin. Asci cylindric-clavate, short-stalked or almost sessile 30–40 × 7μ, rounded above, the pore *not* stained blue in Melzer's reagent, 8-spored. Ascospores biseriate, elliptical or somewhat clavate, 7–10 × 2·5–3μ. Paraphyses slender, cylindrical, about 1·5 thick. (Fig. 8). There are two packets of this species in Herb. Karsten :—" Mustiala, ad Aln. inc. 12 Dec. 1869 " and " 24 Aprilis 1869 ". The former is the better material and is that described

above. Nannfeldt (1932) thought the apothecia originated from the underlying wood and that their association with the lichen was accidental. Study of microtome sections suggests that they are parasitic on the lichen as Karsten believed. The systematic position of this peculiar species is uncertain. Nannfeldt (1932 p. 139 footnote) rejected it from *Pyrenopeziza* and tentatively assigned it to *Hyaloscypha*. The onion-shaped hairs would suit this ascription but most species of *Hyaloscypha* are light-coloured.

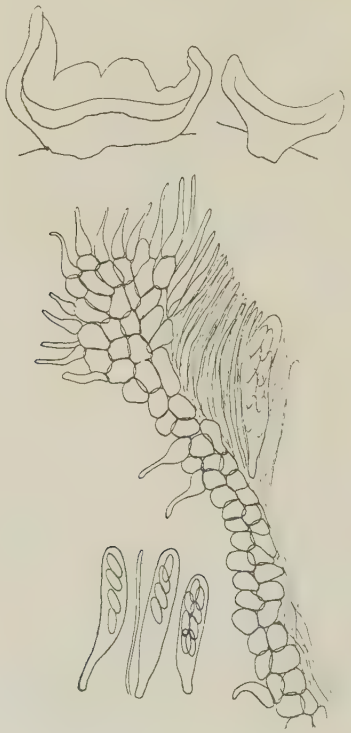


Fig. 8. *Mollisia thallophila*. Vertical sections of 2 apothecia × 50. Section through apothecial margin, asci and paraphysis × 500.

26.* **Mollisia fusca** (*Pers.*) *Karst.** **M. evilescens** (*Karst.*) *Karst.*, Mycol. Fenn. **1,** 208 (1871).

Peziza evilescens Karst. in Not. Sallsk. Fauna Flora Fenn. **10,** 156 (1869).

Trochila fusca (Pers.) Karst.* *Tr. evilescens* (Karst.) Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 244 (1870).

Tapesia evilescens (Karst.) Karst. in Acta Soc. Fauna Flora Fenn. **2** (6), 137 (1885).

Apothecia scattered, superficial, seated on a conspicuous, blackish, subicular web. Disc almost black, concave when dry, flat when moist, up to 1 mm. across. Receptacle cupshaped and contracted when dry, saucer-like on a broad base rather loosely attached to the substrate when moist, dark grey, paler at the margin, smooth. Flesh white, of slender, hyaline hyphae, becoming parallel laterally and passing imperceptibly

into the inner layers of the excipulum. Excipulum of radially arranged, rectangular or rounded, thinwalled cells, about 10–12μ across, the inner layers almost colourless, the outermost dark brown, globose below, elongated and rectangular towards the margin. Subicular hyphae dark-brown, thinwalled, rather sparingly septate, about 3–4μ wide, arranged in an angular meshwork of strands composed of 1–2 hyphae. Asci cylindric-clavate, no longer easily separated but 45×5μ according to Karsten. Ascospores fusiform 5–10×1–1·5μ. Paraphyses not seen.

On dead culms of grasses, the type on *Calamagrostis*, Mustiala Finland, 4 August 1869.

This species is evidently quite distinct from *Tapesia fusca* (Pers. ex Fr.) Fuckel.

TWO NEW SPECIES OF ISCHAEMUM.

N. L. Bor.

In the folders of the genus *Ischaemum* at Kew are a number of sheets which the late Dr. Stapf considered to be new species. These have not, hitherto, been published, and the omission in now remedied.

Ischaemum lacei *Stapf* mss. sp. nov., *I. aristato* Linn. affine, sed ab eo alis spicularum sessilium angustioribus racemis brevioribus distinguendum.

Gramen perenne usque 120 cm. altum. *Culmi* erecti vel geniculatim ascendentes, ramosi, laeves glabrique, nitentes, infra nodos striati, nodis barbati. *Foliorum laminae* usque 17 cm. longae, 15 mm. latae, basi apiceque attentuatae, anguste ellipticae, utrimque densis pilis albis e tuberculis ortis praeditae, marginibus cartilagineis scabrae, in apicem crassum validum attenuatae ; nervus medius prominens, albus ; *vaginae* laxiusculae, plerumque nodis breviores, compressae, striatae, dense pilosae praecipue superne pilis albis e tuberculis ortis, fauci barbatae ; *ligula* oblonga, superne lacerata, ad 5 mm. longa.

Racemi bini-5–6 cm. longi ; spicula sessilis cum spicula pedicellata ad quemvis rhacheos fragilis nodum ; spicula pedicellata ab pedicello soluta, spicula sessilis cum articulo pedicelloque demum disjungens ; articuli 4·5 mm. longi, sectione triangulares, laeves glabrique, angulis longe ciliati (pili usque 2 mm. longi) ; pedicelli articulis similes, aequilongi. *Spiculae* (cum callo barbato 1 mm. longo) 10·5 mm. longae. *Spicula sessilis* ; *gluma inferior* 8 mm. longa, lanceolata vel ovata, superne bialata, dorso rotundata, explanata latissime ovata, apice emarginata, superne margines anguste involutae, media parte dense pilosa ; *gluma superior* 10–10·5 mm. longa, explanata lanceolata, 3-nervis, dorso carinata, dimidia parte superiore alata, carina infra alam barbata, minute bifida ; *arista* scabra, 2·5 mm. longa. *Anthoecium inferum* ♂; *lemma* 6 mm. longum, elliptico-acutum, hyalinum, 3-nerve ; palea aequilonga, 2-nervis. *Anthoecium superius* ♀ ; *lemma* 6·5 mm. longum, 3-nerve, ad medium fissum, ex fissura aristam emittens ; *arista* circiter 2 cm. longa ; *columna* 11 mm. longa, brunnea, torta. *Spicula pedicellata* ; *gluma inferior* 8 mm. longa (cum callo 1 mm. longo), valde compressa, carinata, carina late alata (ala serrata, lata, purpurea, margine lutea) dorso lateribusque pilosa, brevissime aristata ; *gluma superior* 7·5 mm.

longa, dorso plana vel rotundata, superne carina alata, dorso scabra, medio pilosa *Anthoecia superiora* inferioraque eis spiculae sessilis similia sed minora ; arista 11 mm. longa.

Burma. Amherst, Daiona Range, Muleyit Peak 2000 m., 27 Jan. 1912, *J. A. Lace* 5627 (Typus in Herb. Kew.) ; Mogok, Shwe-u-daung Reserve, 20 Dec. 1931, *R. N. Parker*.

Ischaemum duthiei *Stapf* mss., sp. nov., *I. nilagirico* Hack. et *I. hirto* Hack. simile sed ab illo spiculis minoribus, lemmate spiculae pedicellatae inferiore acuminata vel aristato, ab eo racemis numerosis (3–5) distinguitur.

Gramen perenne. *Culmi* usque 80 cm. alti, ramosissimi, laeves glabrique, nitentes, nodis dense albo-barbati, vaginis saepius omnino tecti, infra racemos longe-nudi. *Foliorum laminae* usque 20 cm. longae, 2 cm. latae, basi attenuatae, apice acuminatae, utrimque pilis mollibus longis albis appressis tectae vel supra glabrae, marginibus scabrae, ascendentes haud patentes, eae vaginarum superiorum vestigiales ; *vaginae* inferiores laxiusculae, superiores culmos complectentes, pilis mollibus longis albis tectae, inferne demum glabrae ; *ligulae* membranaceae, 2·5–3 mm. longae.

Racemi 3–5, digitati, 3–7 cm. longi. *Spiculae* ad quemvis rhacheos nodum binae, pedicellata a pedicello demum soluta, sessilis demum cum rhacheos articulo accumbente disjungens ; articuli 2 mm. longi, sectione triangulares, angulis pilis longis albis ciliati, ceterum glabri ; pedicelli articulis aequilongi. *Spicula sessilis* callo stipitato 1 mm. longo insidens ; callus pilis longis albis barbatus ; *gluma inferior* 4–5·5 mm. longa, lanceolata, bicuspidata, superne bicarinata, in parte dimidia inferiore coriacea, glabra, nitens, laevis, in dimidia parte superiore herbacea, multinervis, pilis parcis albis tecta vel glabra, superne carinis scabra, apice in 2 lobos breves acuminatos fissa ; *gluma superior* 4–5 mm. longa, lanceolato-acuminata, dorso inferne rotundata, superne compressa, carinata, 5-nervis, carina anguste alata, dorso laevis glabraque, brevissime aristata. *Anthoecium inferius* ♂ vel vacuum ; *lemma* 3·5 mm. longum, elliptico-acutum ; *palea* similis, aequilonga, 2-nervis ; *stamina* 3 ; *antherae* 2·5 mm. longae. *Anthoecium superius* ♀ ; *lemma* 3·5 mm. longum, hyalinum, ad medium fissum, 2-lobatum, ex fissura aristatum ; palea aequilonga, lanceolata, hyalina ; *arista* 7–8 mm. longa ; *stamina* 3 ; *antherae* 2·5 mm. longae. *Spicula pedicellata* ; *gluma inferior* 4·5 mm. longa, explanata lanceolato-acuta, compressa, carinata, dorso pilis albis longis tecta, multinervis ; *gluma superior* navicularis, 4·5 mm. longa, dorso inferne rotundata, superne carinata, pilis longis albis praecipue carina tecta, brevissime aristata. *Anthoecium inferius* ♂ ; *lemma paleaque* eis spiculae sessilis similes sed breviores ; *stamina* 3 ; *antherae* 2 mm. longae. *Anthoecium superius* ♀ ; partes omnes eis spiculae sessilis similes.

India. Central Provinces : Pachmari, 24 Feb. 1841, *J. F. Duthie* 10623 " by streams " ; Chota Nagpur, Liohardugga 19 Oct. 1883, 700 m., *C. B. Clarke* 33875A. Bihar : Neterhat, 1000 m., Oct. 1918, *H. H. Haines* 5856, " along streams " (Typus) ; Singbhum, Nov. 1898, *H. H. Haines* 128. Bengal : Western Bengal and Behar, Herb. Sulpiz Kurz.

NOTES ON CYPERACEAE : XXIV.*

E. Nelmes.

New and Other Interesting Malaysian Carices, mostly from the Leiden and Buitenzorg Herbaria.

Notes XXII and XXIII were concerned with the Brass and Clemens New Guinea *Carices* respectively. They were written as part of the preliminary work of a revision of the Malaysian *Carices*, and the same is true of this Note, which describes the results of the examination of the very large *Carex* collections in the Leiden and Buitenzorg herbaria.

The main contents of this paper are descriptions of new species and varieties, but there are also notes referring to *Carices* new to Malaysia, to a few long-standing misidentifications, and to newly discovered extensions of range. I also venture to record those of my determinations which differ from Dr. Kükenthal's, as published in Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 313–322 : 1940. In this important paper he was dealing with various gatherings, but especially with a large collection of *Cyperaceae* made by Dr. van Steenis in Atjeh, Sumatra, in 1937. I regret to say that I have not seen some of these van Steenis numbers, including the whole material published of *Carex semiglomerata* Kükenth. and *C. vansteenisii* Kükenth., which are apparently not represented in either the Leiden or the Buitenzorg herbarium. They may have been destroyed in Germany during the late war.

Carex helferi *Boeck.* in Linnaea, 40 : 365 : 1876.

Java : Waterfall, November, ex Herb. *Reinwardt.*

Considerably smaller vegetatively than the only other specimens of this species hitherto known, from Lower Burma and Siam, but closely agreeing with them in glume and fruit characters. This is the first and only record from the Flora Malesiana area of any of the very wide-leaved (up to 3 cm. or more) *Carices*, which are mainly confined to Indo-China.

C. perakensis *C. B. Clarke* in Hook f. Fl. Brit. Ind. 6 : 720 : 1894.

[*C. nodiflora* (non Boeck.)—Kükenth. in Bull. Jard. Bot. Buitenz. sér. 3, 16 : 316 : 1940.]

Sumatra : Atjeh ; Gajolanden, Poetjoek Agoesan, forested crest above Penosan, 1600 m., 27 Jan. 1937, *van Steenis* 8277.

C. nodiflora is quite specifically distinct from *C. perakensis* and is endemic in the Philippines.

C. perakensis *C. B. Clarke.*

C. vansteenisii Kükenth. var. *brevispiculosa* Kükenth. l.c. 321.

Sumatra : Atjeh ; Kapiterreinen, swamp at the confluence of the rivers Kapi and Aoenan, 1100–1250 m., 21 March 1937, *van Steenis* 9934.

As mentioned above, I have not had a chance of seeing *C. vansteenisii* itself. From its description I am inclined to think it may well be a distinct and interesting species .

*Continued from K.B. 1949, 392.

Kjellberg 1479, collected in Celebes, 28 May 1929, and placed tentatively by Kükenthal under his *C. pseudo-rivulorum* (l. c. 320) also belongs, I think, to *C. perakensis*, but the specimen seen is poorly developed.

C. ?tonkinensis *Franch.* in Nouv. Arch. Mus. Hist. Nat. sér, 3, 8 : 251 : 1896.

[*C. pseudo-rivulorum* (non Kükenth.)—Kükenth. l.c. 319.]

Sumatra : East Coast ; Dolok Singgalang, north of Toba lake, 1700 m., 25 May 1922, *Lörzing* 8874.

Borneo : British North Borneo ; Mt. Kinabalu, on Penataran river, 2550 m., 21 June 1933, *Clemens* 33652.

I have not seen the other specimen cited as *C. pseudo-rivulorum* by Kükenthal from Sumatra (Atjeh, 15 Feb. 1937, *van Steenis* 8783).

C. tonkinensis is a species which has not yet been clearly distinguished from *C. perakensis*, and these Sumatran and Bornean plants may possibly represent an undescribed species.

C. tricephala *Boeck.* in Flora, 58 : 263 : 1875. Madura.

C. madoerensis C. B. Clarke in Journ. Linn. Soc. 37 : 15 : 1904.

C. thorelii E. G. Camus in Lecomte, Not. Syst. 1 : 295 : 1910. Indo-China.

C. plesiocephala Turrill in Kew Bull. 1910 : 385 : 1910. Siam, Upper Burma.

When I made my Key to the *Carices* of Malaysia I had not seen the type of *C. tricephala* (*Zollinger* 1778), and I kept this species separate from *C. thorelii* (*C. plesiocephala*). Their descriptions did not entirely agree with each other, and their distributions also indicated different species. I have now seen Zollinger's plant, which is the type of both *C. tricephala* and *C. madoerensis*, and it is undoubtedly the same species as *C. thorelii*, from Burma, Siam, and Indo-China. Mr. Airy Shaw has pointed out that the distribution is somewhat similar to that of the teak tree, *Tectona grandis* L.

It may be of interest to mention here that included in the Buitenzorg *Carex* loan was a specimen in spirit labelled " C. ovata. Java. Backer 20462 ". It presumably purports to be a specimen of Burman's *C. ovata*, which is probably a species of *Cyperaceae* but almost certainly not a *Carex*, as Burman, Dr. van Steenis tells me, collected only in coastal areas in Malaysia, where unispicate *Carices* do not grow. The specimen in spirit is a single spike taken, as I think, from a plant of *C. tricephala*.

C. horsfieldii *Boott* var. **major** *Nelmes*, var. nov. ; a typo glumis majoribus, utriculis multo longioribus substrictis, achaeniis majoribus differt.

Moluccas : Tenimber Islands (Timor Laut), P. Jamdena, Otimmer, primary forest, low altitude, 28 March 1938, *Buwalda* 4469 (typus, Herb. Hort. Bogor. ; fragm., Herb. Kew.).

The much larger and straighter utricles than those of the species give this local plant a quite distinctive appearance.

C. stramentitia *Boott ex Boeck.* in Linnaea, 40 : 351 : 1876.

Java : Batavia ; Krawang, Palered, near Poerwakarta, 20 Oct. 1924, *Bakhuizen van den Brink* 6565.

New for Malaysia. Not previously known south of Upper Burma. The Java plant is rather more robust, and more bristly below the nodes, than Indian specimens, and its utricles have a more pronounced spongy base.

Carex buennemeijeri *Nelmes*, sp. nov. ; affinis *C. semiglomeratae* Kükenth., sed foliis latioribus, inflorescentiis latioribus, glumis brevioribus semper glabris pallidioribus apice magis obtusis, utriculis subinflatis distincte nervosis, rostris brevioribus differt.

Caespitosa. *Rhizoma* descendens, crassum, lignosum. *Culmi* erecti sed apice fortasse subcernui, trigoni, angulis plerumque acuti, 110–150 cm. alti, inferne 3–4 mm. crassi, laeves. *Folia* basilaria et subbasilaria, et 1–2 caulina, longa sed culmum non excedentia, 9–15 mm. lata, plana vel planiuscula, interdum tenuiter septato-nodulosa, supra superne scabrida ; *vaginae* atro-rubidae dorso inferne rubidinerves. *Inflorescentia* composite continua vel interrupte paniculata, 50–70 cm. superiores culmorum occupans ; *paniculae secundariae* 8–10, plerumque binae, infimae plerumque singulae, oblongae vel lanceolatae, 4–12 cm. longae, 1–3·5 cm. latae, subdensae vel densae, ramulis patulis, inferioribus iterum in spicas simplices ramosis, spicis patulis vel patentibus, paniculae inferiores distantes vel remotae, superiores subapproximatae vel subdistantes, inferiores longe vel longissime, superiores vix vel longe, exserte pedunculatae ; *pedunculi* trigoni vel compressi, subtenues, angulis acuti hispiduli. *Rhachis* inferne laevis, superne et rhachis panicularum secundariarum hispidula. *Bracteae* foliaceae sed superiores redactae, inferiores culmo breviores, superiores eas aequantes vel leviter excedentes, inferiores longe vel longissime, superiores breviter vel longe, vaginantes ; *vaginae* glabrae, ore membranaceae brunneae hispidulae, nodis aureae vel aureo-brunneae. *Spicae* numerosae, androgynaeceae, 3·5–6 mm. longae, subdensiflorae, sessiles, parte mascula parti femineae subaequilonga. *Bracteolae* glumiformes, parvae, hispidulae, breviter vel longe aristatae. *Cladoprophylla* utriculiformia. *Glumae femineae* ovatae cymbiformes, apice plerumque obtusae vel rotundae sed interdum subacutae seape eroso-ciliatae, 1·5–2 mm. longae, 1–1·4 mm. latae, translucentes, glabrae, pallidae vel albidae, lineolis parvis rubidis maculatae, nervosae, vitta mediana trinervi nervis superne coalitis ex apice inferne plerumque excurrente ; *arista* laevis vel marginibus minute hispidula, usque 0·25 mm. longa. *Utriculi* plus minus ellipsoidei, obtuse trigoni, demum subinflati, 2·5–3·25 mm. longi, circiter 1 mm. lati, membranacei, valde plurinerves, nervis 1–2 in media facie dorsali demum incrassatis sulcum medianum efficientibus, glabri vel interdum in facie ventrali apice parce setulosi, vix vel angustissime marginati, stricti vel subcurvati, virides, rubido-maculati, demum fulvi vel brunnei, basi spongioso-incrassati, haud stipitati, subsensim vel subabrupte rostrati ; *rostrum* plano-convexum, vix vel sensim acuminatum, 1–1·25 mm. longum, marginatum, marginibus parce hispidulum, bidentatum ; *os* haud obliquum ; *dentes* 0·2–0·4 mm. longi, stricti. *Achaenium* ellipsoideum vel oblongo-

ellipsoideum, trigonum, 1·5–1·75 mm. longum, 0·8–0·9 mm. latum, haud stipitatum, abrupte brevissime leviter bulbose saepe inflexe rostratum. *Stylus* basi subincrassatus. *Stigmata* 3.

Sumatra : Mt. Singgalang, underwood, common, ± 1300 m., 25. May 1918, *Bünnemeijer* 2530 (typus, Herb. Hort. Bogor. ; fragm., Herb. Kew.) ; Mt. Merapi, in forest by river, 1400 m., 16 Sept. 1918, *Bünnemeijer* 4651 ; Sinaboeng, north slopes, primitive forest, in lightish places, widespread, ± 1550 m., 19 Jan. 1921, *Lörzing* 8223 ; Berastagi, rain-forest, in lightish places, common, 1600 m., 9 Dec. 1928, *Beumée* A818.

Moluccas : Ceram ; Middle Ceram, Central Mountains, Gunung Hale, 1000 m., May–Aug. 1911, *Stresemann* 160 ; West Ceram, Salahóea-Toplána-Meóte-Honitétoe, 1160 m., 31 Jan.–2 Feb. 1938, *Eyma* 2725.

Besides its obvious affinity with *C. semiglomerata* Kükenth., this species, through its stoutly-nerved utricles, bears some relationship to *C. cruciata* Wahlenb. and its allies.

Carex oblonga *Nelmes*, sp. nov. ; affinis *C. rafflesianae* Boott, sed foliis angustioribus, paniculis secundariis minoribus oblongis, glumis majoribus apice obtusis, utriculis majoribus fusco-rubidis, rostris longioribus, achaeniis majoribus differt.

Caespitosa. *Rhizoma* breve, lignosum, squamis vaginatis fusco-rubidis vel fibrillosis vestitum. *Culmi* plus minus erecti, trigoni, 47–127 cm. alti, inferne 1–1·5 mm. crassi, usque ad partem rhacheos superiorem laeves. *Folia* subbasilaria, interdum 1–2 in caule superne sita, inferiora pauca ad vaginas atro-rubras redacta, circa basin culmi interdum ut fibrilli fusco-rubidi persistentia, culmum plerumque aequantia, 3–7 mm. lata, plana vel revoluta, subcoriacea, inferne laevia, supra superne scabro-vesiculosa ; *vaginae* foliorum subbasilarium rubidae, demum in fibris reticulatim fissae. *Inflorescentia* composite interrupte paniculata, 15–33 cn. superiores culmorum occupans ; *paniculae secundariae* 4–5, singulae erectae vel plus minus cernuae, 2·5–7·5 cm. longae, 8–13 mm. latea, plus minus oblongae, superiores approximatae vel subapproximatae, fastigiatae, inferiores distantes ve lremotae, vel unispicatis vel inferioribus in spicas 2–5 simplices ramulosis, paniculae superiores vix vel breviter, inferiores longe vel longissime exserte pedunculatae ; *pedunculi* trigoni vel compressi, graciles, inferne laeves, superne hispiduli. *Rhachis* panicularum secundariarum plerumque angulis hispidula. *Bracteae* foliaceae sed superiores multo redactae, inflorescentias subaequantes inferiores longe superiores breviter vaginantes ; *vagiane* plus minis hispidulae. *Spicae* subnumerosae, androgynaeceae, sessiles, subdensiflorae, 4–7 mm. longae, parte mascula parti femineae aequilonga, pauciflorae. *Bracteolae* glumiformes, plus minus oblongae, apice rotundatae, 1 mm. longae, hispidulae ; *arista* stricta vel flexuosa, hispidulo-marginata, plerumque longa. *Cladoprophylla* superne utriculiformia, superne glumiformes, circiter 2 mm. longa. *Glumae femineae* ovatae vel oblongo-ovatae, cymbiformes, apicep lerumque obtusissimae, 2–2·75 mm. longae, 1·5–2 mm. latae, translucentes, glabrae vel infima interdum parce hispidula, nervosae, vitta mediana trinervi, nervis superne coalitis, ex apice plerumque excurrente ; *arista* laevis vel ciliolato-hispidula. *Utriculi* ellipsoidei vel oblongo-ellipsoidei, trigoni vel compressi, 4–4·5 mm. longi, 1–1·25 mm. lati, subcoriacei, multinerves,

inferne glabri, superne pallide subadpresso-setulosi, marginati, stricti vel interdum leviter recurvati vel reflexi, inferne straminei, superne rubri vel atro-rubidi, demum patuli, vix stipitati, sensim rostrati ; *rostrum* acuminatum, compresso-trigonum, 1·25–1·5 mm. longum, bidentatum ; *dentes* 0·25–0·5 mm. longi, stricti : *os* strictum vel leviter dorsaliter obliquum. *Achaenium* oblongo-ellipsoideum, trigonum, faciebus inferne concavum superne planiusculum, brevissime stricte vel leviter reflexo-stipitatum, abrupte rostratum. *Stylus* vix basi incrassatus. *Stigmata* 3.

Celebes : South-West Celebes ; Lombasang, forest, ± 950 m., 20 April 1921, *Bünnemeijer* 11084 ; Mt. Bonthain, north-west slope, forest, ±2200 m., 6 June 1921, *Bünnemeijer* 11858B (flowering) ; ibid., ± 2450 m., 8 June 1921, *Bünnemeijer* 11972 (fruiting, typus, Herb. Kew.; dupl., Herb. Hort. Bogor.).

Its narrow leaves and oblong and comparatively small secondary panicles give this species a very different appearance from its nearest relative, *C. rafflesiana* Boott.

Carex ceramica *Nelmes*, sp. nov. ; affinis *C. sarawaketensi* Kükenth., sed paniculis secundariis paucis singulis, utriculis dense hispidulis, ventre paucinerviis, rostro longioribus differt.

Vix caespitosa. *Rhizoma* stoloniferum, horizontale vel descendens, squamis vaginatis fuscis vel atro-rubris vestitum, demum fibrillosis. *Culmi* erecti vel subcurvati, trigoni, 30–50 cm. alti, 1–1·25 mm. crassi, laeves. *Folia* subnumerosa, basilaria vel subbasilaria, 1 vel plures in caule superne sita, culmo breviora, 4–6 mm. lata, planiuscula ; *vaginae* foliorum basilarium rubidae vel atro-rubrae, demum fibrillosae. *Inflorescentia* composite interrupte anguste paniculata, 10–20 cm. superiores culmorum occupans ; *paniculae secundariae* 4–5, singulae, erectae vel suberectae, oblongae, oblongo-lanceolatae, vel subpyramidales, 3–7 cm. longae, 1·2·5 cm. latae, inferiores approximatae, inferiores distantes, subdensae, ramis omnibus spicas simplices sistentibus vel inferioribus in spicas simplices 2–5 ramulosis, paniculae inferiores longe, superiores vix vel breviter, exserte pedunculatae ; *pedunculi* acute trigoni, tenues, angulis hispiduli. *Bracteae* foliaceae sed superiores minores, culmum aequantes vel eo breviora, superiores breviter inferiores longe vaginantes ; *vaginae* glabrae vel suprema hispidula. *Spicae* numerosae, androgynaeceae, 6–13 mm. longae, plerumque laxiflorae, suberectae vel patulae, sessiles, parte mascula quam pars feminea breviore vel multo longiore. *Bracteolae* glumiformes, muticae vel longiaristatae. *Cladoprophylla* inferne utriculiformia, superne glumiformia. *Glumae femineae* ovatae vel triangulari-ovatae, cymbiformes, apice acutae vel obtusae, 1·75–3 mm. longae, 1·5–2 mm. latae, translucentes, inferiores hispidulae, superiores parce hispidulae vel glabrescentes, enerves vel tenuissime nervosae, castaneae, marginibus superne anguste albo-hyalinae, vel inferne castaneae et superne omnino albidae, nervo mediano plerumque apicem non attingente, interdum excurrente ; *arista* marginibus hispidula, usque 0·75 mm. longa. *Utriculi* ellipsoidei, obtuse trigoni, faciebus planiusculi, 3·5–4 mm. longi, 0·8–0·9 mm. lati, submembranacei, plurinerves, anguste marginati, plerumque basi excepta dense albido-vitreo-hispidi, interdum facie dorsali glabri vel glabrescentes, stricti vel subrecurvi, demum patuli, basi pallida excepta fusco-rubidi, vix spongioso-stipitati, subsensim vel sub-

abrupte rostrati ; *rostrum* plano-convexum, 1·75–2 mm. longum, vix acuminatum, anguste marginatum, hispidulum, bidentatum ; *os* dorso perobliquum ; *dentes* subbreves, apices albo-hyalini, demum erosi. *Achaenium* ellipsoideum vel oblongo-ellipsoideum, trigonum, 1·75–2mm. longum, 0·75–0·9 mm. latum, brevissime reflexe interdum torte rostratum. *Stylus* vix basi incrassatus. *Stigmata* 3.

Moluccas : Ceram ; Middle Ceram, Gunong Pinaia, ± 2860 m., " Mattenregion " of the west peaks, on the crest, end of Aug. 1911, *Stresemann* 253 (typus, Herb. Lugd.-Bat. ; dupl., Herb. Kew.) ; ibid., ± 2750–3000 m., *Stresemann* 275.

The long beak of the utricle distinguishes this species sharply from *C. sarawaketensis*, to which and to *C. gembolensis* C. B. Clarke it is closely akin.

C. gembolensis *C. B. Clarke* var. **crebra** *Nelmes*, var. nov. ; a typo paniculis secundariis densissimis, glumis apice acutioribus, utriculis ovoideo-ellipsoideis obscure nervosis differt.

Lesser Sunda Islands : Flores ; Geli-Mortoe, summit, open stony crater-field (Solfatara-dump), generally scattered, ± 1580 m., 4 Nov. 1932, *Posthumus* 3037 ; Flores, 30 July 1933, *de Voogd* 1830 (typus, Herb. Lugd.-Bat. ; fragm., Herb. Kew.).

Though the very dense panicles of this plant give it a different facies, it is essentially similar to the species.

C. filicina Nees var. ***zipelii** Nelmes, var. nov. ; a typo foliis angustioribus, paniculis secundariis minoribus singulis, glumis ovato-triangularibus aristatis differt.

New Guinea : On rocks, " ex Herb. *Zippelius " (typus, Herb. Kew.).

This specimen seems to be a depauperate one. If not it may represent a species between *C. filicina* and *C. papuana* Nelmes.

var. **angustifolia** *Nelmes*, var. nov. ; a typo culmis minoribus, foliis angustioribus, utriculis minoribus differt.

Philippine Islands : Luzon ; Tayabas, Mt. Banahao, 2200 m., 22 June 1904, *Klemme* (For. Bur. No. 866) ; ibid., Oct. 1904, *Whitford* 949 ; Benguet ; Pauai, mossy forest, 2200 m., *Merrill* 4743 ; Laguno ; Mt. Banajao, Feb. 1911, *Merrill* 7496 ; Rizal ; Sept. 1915, *Ramos* (But. Sci. No. 23855). Mindanao ; Zambanga, Nov.-Dec. 1911, *Merrill* 8208. Negros ; Caulaon Volcano, ± 1800 m., April 1910, *Merrill* (typus, Herb. Kew.).

It is very probable that this variant of *C. filicina* occurs in other parts of Malaysia.

C. baccans *Nees* in Wight, Contrib. Bot. Ind. 122 : 1834.

C. javanica Boeck. Cyp. Nov. 1 : 43 : 1888.

Java : Preanger ; Megamendon, 1350 m., 4 June 1875, *O. Kuntze* 4790.

*The spelling of this name is with one ' p' (see de Wit in Fl. Mal. sér. 1, 42, cviii.

Kükenthal (Engl. Pflanzenr. 1909) includes this plant under *C. walkeri* Arn. ex Boott, Subgen. *Eucarex* Coss. et Germ. Through the courtesy of Dr. Merrill and the New York Botanical Garden I have seen the type of *C. javanica*, and though the inflorescences are very young I feel sure that the species is *C. baccans* Nees, Subgen. *Indocarex* Baill.

C. myosurus *Nees* var. **celebica** *Nelmes*, var. nov. ; a typo spicis brevioribus, interdum fere omnino masculis, gluniis femineis brevioribus, utriculis angustioribus magis distincte nervosis sensim rostratis differt.

Celebes : South-West Celebes ; north-west side of Mt. Bonthain, ± 1450 m., 18 May 1921, *Bünnemeijer* 11630 ; ibid., Mt. Bonthain, ± 1700 m., 19 June 1921, *Bünnemeijer* 12343 (typus, Herb. Lugd.-Bat.) ; ibid., ± 1850 m., 21 June 1921, *Bünnemeijer* 12410.

In spite of its distinct general appearance, this plant does not differ essentially from its species. *C. myosurus* itself has not been found south of Lower Burma. This Burma plant was misidentified by C. B. Clarke (Fl. Brit. Ind. 6 : 724 : 1894) as *C. composita* Boott.

C. verticillata *Zoll. et Mor.* var. **havilandii** (*C. B. Clarke*) *Nelmes*, comb. nov.

C. havilandii C. B. Clarke in Journ. Linn. Soc. 37 : 13 : 1904. British North Borneo, *Haviland* 1403.

C. hypsophila Miq. var. *havilandii* (C. B. Clarke) Kükenth. in Engl. Pflanzenr. IV, 20 : 546 : 1909.

It has been generally overlooked that *C. verticillata* Zoll. et Mor. is an earlier and apparently the correct name for the species hitherto known as *C. hypsophila* Miq.

C. verticillata *Zoll. et Mor.* var. **lutescens** *Nelmes*, var. nov. ; a typo foliis longioribus, spicis longioribus lutescentibus, glumis brevioribus, utriculis brevioribus differt.

Java : Pasoeroean ; Mt. Smeroe, Ranoe Koembolo, 6 July 1929, *Jeswiet* 40 (typus, Herb. Lugd.-Bat. ; dupl., Herb. Kew.).

This is not merely a colour variant, as can be seen from the description, and it seems well worthy of varietal rank.

Carex phacelostachys *Nelmes*, sp. nov. ; affinis *C. verticillatae* Zoll. et Mor., sed fasciculis pro rata paucispicatis, sexubus in spicis alia ratione dispositis, glumis longioribus longius aristatis, utriculis majoribus nervosis brevius latiusque rostratis differt.

Caespitosa. *Rhizoma* obliquum, breviter stoloniferum, gracile, lignosum, squamis brevibus valde nervosis brunneis vestitis. *Culmi* erecti vel suberecti, apice ut videtur subcernui, trigoni, 30–50 cm. alti, inferne circiter 1·5 mm. crassi, apice parce scaberulo excepto laeves, rhachi inferne saepe vaginis aphyllis longe vestita, basi, infra folia, cataphyllis rubidis paucis circumdati. *Folia* plerumque basilaria vel subbasilaria, sed 1-plures in culmo superne sita, plerumque culmo breviora sed pauca eo sublongiores, 2·5–6 mm. lata, plana vel planiuscula, marginibus interdum revoluta, subcoriacea, supra superne scabrida ; *vaginae* foliorum basilarium ventre membranaceae et saepe rubidae, ore concavae et glabrae. *Inflorescentia* gracilis, continua vel paullo interrupte paniculata, 24–27·5 cm. superiores culmorum occupans ; *fasciculi* 5–7,

quoque fasciculo 1–3 spicato, spicis inaequaliter pedunculatis, brevipedunculatis simplicibus, longipedunculatis in spicas simplices 2–6 ramosis, fasciculi superiores approximati vel subapproximati et fastigiati vel subfastigiati, inferiores subdistantes sed saepe subfastigiati. *Bracteae* inferiores foliaceae, culmo multo breviores vel eo sublongiores, longivaginantes, superiores multo redactae, subfoliaceae, filiformes, plerumque culmo breviores sed interdum eo sublongiores, breviter vel sublongivaginantes. *Spicae* (supremis aliisque longioribus curvatis vel cernuis exceptis) strictae, erectae vel suberectae, spicae fasciculorum inferiorem et mediorum, dum simplices, femineae, spicae mediae, dum ramosae vel longipedunculatae, androgynaeceae, spicae superioes masculae vel basi floribus paucis femineis instructae, cylindricae, 1–8 cm. longae, laxi- vel subdensiflorae, masculae et partes masculae androgynaecearum 1–2 mm. crassae, femineae 4–5 mm. crassae ; *pedunculi* obtuse trigoni vel subtereti, tenues (0·25–0·6 mm. crassi), laeves. *Bracteolae* vaginiformes, tubulosae. *Cladoprophylla* ocreiformia vel subutriculiformia, 2–4·5 mm. longa, apice interdum biloba. *Glumae femineae* oblongo-ovatae vel oblongo-lanceolatae, basi gibbae, incurvae, inferne cymbiformes, apice plerumque obtusae vel obtusissimae, interdum subacutae, 4–6 mm. longae, circiter 2 mm. latae, translucentes, rubidae, marginibus latissime albo-hyalinae, demum erosae, tenuiter nervosae, nervo mediano saepe pallido, apicem versus hispidulo, carinato, in aristam hispidulam 0·25–1·5 mm. longam excurrente ; *glumae masculae* longiores et latiores. *Utriculi* ellipsoidei, trigoni, 5·5–5·75 mm. longi, circiter 1 mm. lati, membranacei, dorsaliter 3–6-nervis, ventraliter 2-5-nervis, angustissime marginati, glabri, stricti vel leviter recurvati, demum subpatuli, olivacei, rubri vel atro-rubro-maculati, inferne acuminati et spongioso-pseudo-stipitati, apice sensim vel subsensim rostrati ; *rostrum* leviter acuminatum, concavo-convexum, 1·5–2·5 mm. longum, anguste marginatum, glabrescens vel sparse hispidulo-marginatum, bilobum vel bidentatum ; *os* ventraliter subobliquum ; *dentes* vel lobi stricti, albo-hyalini, demum erosi. *Achaenium* oblongo-ellipsoideum, interdum oblongo-obovoideum, trigonum, 1·75–2 mm. longum, 0·9 mm. latum, inferne acuminatum, vix stipitatum, apice subrotundum erostratum. *Stylus* basi incrassatus. Stigmata 3, longiuscula.

Malay Peninsula : Perak ; Gunong Kerbau, 1980 m., 12 March 1913, *H. C. Robinson* (typus, Herb. Kew.).

This species has lain unnamed since its discovery, except that Ridley wrote ' *C. walkeri* var.' on the Kew and Singapore sheets. It is a much smaller plant than *C. walkeri* Arn. ex Boott, and more closely related to that other member of its group, *C. verticillata* Zoll. et Mor. Closer still is an unnamed Laos plant (Mt. Pu Bia, *Kerr* 21041), about which I am not yet sufficiently sure to include here.

var. **losirensis** (*Kükenth.*) *Nelmes*, comb. nov. ; a typo fasciculis pro rata multispicatis, spicis laxifloris, utriculis ellipsoidei-lanceolatis longius rostratis differt.

C. decora Boott var. *losirensis* Kükenth. in Bull. Jard. Bot. Buitenz. sér. 3, 16 : 319 : 1940.

Sumatra : Atjeh ; Gajolanden, Mt. Losir, mid-summit and burnt-over east summit and ridge, common, 2950–3500 m., 5–6 Feb. 1937, *van*

Steenis *8682 ; ibid., mountain heath, *van Steenis* 8658 (typus, Herb. Hort. Bogor. ; fragm., Herb. Kew.).

I have compared this Sumatran sedge with the Indian *C. decora* Boott, and to me the two are abundantly distinct. I place the former between *C. verticillata* and *C. phacelostachys*, but nearer to *C. phacelostachys*.

Carex atrosanguinea *Nelmes*, sp. nov. ; affinis *C. gibbsiae* Rendle, sed glumis et utriculis atro-rubris, rostris brevioribus subsensim acuminatis, stipitibus multo brevioribus, achaeniis majoribus oblongo-ellipsoideo-obovoideis differt.

Vix caespitosa. *Rhizoma* elongatum sed haud longe stoloniferum, crassiusculum, lignosum. *Culmus* erectus vel apice leviter cernuus, trigonus, 77 cm. altus, inferne 1·5 mm. crassus, rhachibus inferne inclusis laevis, angulis acutis apicem versus parce scaberulous. *Folia* basilaria, longa sed culmo multo breviora, 4–5 mm. lata, planiuscula vel marginibus revoluta, supra apicem versus scabrida longe attenuata ; *vaginae* brevissimae, rubidae vel atro-rubidae, demum fibrillosae. *Inflorescentia* interrupte anguste paniculata, 49 cm. superiores culmorum occupans ; *fasciculi* 7, quoque fasciculo 4–6-spicato, spicis simplicibus, fasciculi inferiores distantes, superiores subapproximatae. *Bracteae* fasciculorum inferiorum foliaceae, fasciculum proprium aequantes vel excedentes longivaginantes, superiores multo redactae setaceae, fasciculo proprio multo breviores, breviter vaginantes ; *vaginae* dorso inferne atro-rubrae, superne viridi-rubrae, ventre membranaceae, inferiores glabrae, superiores superne minute setulosae. *Spicae* erectae vel longiores subcernuae, in quoque fasciculo inaequaliter pedunculatae sed fastigiatae, androgynaeceae sed parte mascula brevi, 2–4 cm. longae, parte feminea 2·5–3·5 mm. crassa, parte mascula tenuissima, sublaxiflorae, spicae facioulorum superiorum vix vel breviter, inferiores inaequaliter longe, exserte pedunculatae ; *pedunculi* tenues (0·5–0·6 mm. crassi), trigoni vel compressi, angulis plus minus minute scaberuli. *Glumae femineae* obovatae vel oblongo-obovatae, apicem versus triangulares, vel oblongae et apice rotundatae, basi incurvae, superne cymbiformes, apice subacutae vel obtusissimae, 2·75–3·3 mm. longae, 1·52 mm. latae, subtranslucentes, glabrae, inferne marginibus pallide viridulae, ceterum atro-rubrae, sed marginibus apicem versus anguste vel sublate albo-hyalinae, tenuiter sed distincte nervosae, vitta mediana trinervi, nervis superne coalitis, sub apicem excurrente ; *arista* marginibus minute hispidula, usque 1·2 mm. longa. *Utriculi* ellipsoidei sed basi et apice attenuati, trigoni, faciebus planiusculi, 5–6 mm. longi, 0·9–1·1 mm. lati, membranacei, ventre tenuiter 1–4-nerves, dorso 3–6-nerves, anguste marginati, basi glabra excepta subparce albo-hispiduli, saepe etiam marginibus et secus nervos, stricti, subpatuli vel patuli, plerumque inferne pallide flavido-virides et superne atro-rubri, basi sensim acuminati spongioso-incrassati, stipite ipso brevissimo (0·2–0·4 mm. longa), in rostrum sensim vel subsensim acuminati ; *rostrum* sensim acuminatum, plano-convexum, 1·75–2·25 mm. longum, anguste marginatum, hispidulo-marginatum, inferne atro-rubrum, superne viride, bidentatum ; *os* haud obliquum ; *dentes* stricti, lanceolati, 0·3–0·5 mm. longi. *Achaenium* oblongo-ellipsoideo-obovo-

*This is labelled (probably in error) as ' type', but no. 8658 is much the better specimen and I choose this as lectotype.

ideum, trigonum, faciebus concavum, 3–3·5 mm. longum, 0·8–0·9 mm. latum, stramineum sed basi albidum, 0·3–0·4 mm. stipitatum ; *rostrum* subtrigonum, 0·2–0·5 mm. longum, strictum vel interdum subinflexum. *Stylus* basi subincrassatus. *Stigmata* 3, raro 2, 3–4 mm. longa, curvata vel flexuosa.

Papua : Central Division ; Mt. Tafa, a few plants on open burnt-over ground in mossy forest, 2350 m., May–Sept. 1933, *Brass* 4068 (typus, Herb. Lugd.-Bat. ; fragm., Herb. Kew.).

This species, though closely related to *C. gibbsiae* (Fiji) looks very distinct because of its different colouring.

Carex pullei *Nelmes*, sp. nov. ; affinis *C. atrosanguineae* Nelmes, sed foliis angustioribus, spicis interdum compositis, glumis superne interdum furfuraceo-hispidulis, utriculis minoribus oblongo-ellipsoideis dorsaliter glabris, achaeniis multo brevioribus differt.

Laxe caespitosa. *Culmus* erectus vel apice leviter cernuus, trigonus, circiter 60 cm. altus, inferne 1–2 mm. crassus, rhachi superne angulis scaberula excepta laevis, basi vaginis aphyllis fusco-rubidis circumdatus. *Folia* basilaria vel subbasilaria, culmo breviora, 2–4 mm. lata, plana vel canaliculato-conduplicata, saepe supra scabrida, rigida ; *vaginae* atro-rubidae, basilares demum fibrillosae. *Inflorescentia* interrupte anguste paniculata, 25–40 cm. superiores culmorum occupans ; *paniculae secundariae* 4–6, fasciculatae, quoque fasciculo 1–7-spicato, spicis plerumque simplicibus sed longioribus saepe in spicas 1-plures breviores ramosis, fasciculae inferiores distantes, superiores subapproximatae. *Bracteae* panicularum inferiorum foliaceae, fasciculum proprium aequantes vel eo longiores, longe vaginantes, bracteae superiores multo minores, setaceae, fasciculo proprio breviores, breviter vaginantes ; *vaginae* glabrae vel superiores ore minute hispidulae, inferne rubido-spadiceae, ventre membranaceae. *Spicae* erectae vel longiores subcernuae, cylindricae, inaequaliter pedunculatae, fastigiatae, androgynaeceae, 1–4 cm. longae, parte mascula quam pars feminea breviore, tenues, parte feminea 2–3 mm. crassa, sublaxiflora, spicae fasciculorum superiorum vix vel breviter, inferiores longe vel longissime, exserte pedunculatae ; *pedunculi* tenues (0·2–0·25 mm. crassi), trigoni vel compressi, angulis glabri vel minute scabro-hispiduli. *Glumae femineae* plus minus oblongae vel oblongo-obovatae, apice triangulares, cymbiformes, basi incurvae, apice acutae vel obtusae saepe leviter ciliolatae, 2–3 mm. longae, 1–1·8 mm. latae, subtranslucentes, plerumque glabrae sed superne interdum minute furfuraceo-hispidulae, vinaceae vel fusco-rubrae, marginibus superne late albo-hyalinae, demum erosae, basi pallidae, vel basi fusco-rubra excepta albidae, tenuiter nervosae, vitta mediana trinervi nervis superne coalitis ex apice plerumque in aristam laevem vel minute hispidulam excurrente usque 0·75 mm. longam. *Utriculi* anguste ellipsoidei vel oblongo-ellipsoidei, distincte trigoni, faciebus planiusculi, 3–4 mm. longi, 0·8–1 mm. lati, membranacei, ventre (facie adaxiali) enerves vel tenuiter 1–3-nerves, dorso (facie abaxiali) tenuiter 4-nerves, vix vel angustissime marginati, dorso glabri, ventre superne parce vel parcissime setulosi, marginibus supra medio vel basi breviter setulosi, stricti vel leviter recurvi, demum patuli, inferne olivacei, interdum rubido-vel fusco-vinaceo-maculati, vel fusco-atro-rubri, basi acuminati, spongioso-

incrassati, stipite ipso brevissimo, apice subsensim rostrati ; *rostrum* acuminatum, plano-convexum, 1–1·5 mm. longum, anguste marginatum, setuloso-marginatum, bidentulum ; *os* vix dorso obliquum ; *dentes* glabri, pallidi, demum erosi, stricti, lanceolati, brevissimi (0·2 mm. longi). *Achaenium* ellipsoideum vel oblongo-ellipsoideum, trigonum, faciebus planiusculum vel subconcavum, 1·6–2 mm. longum, 0·75–0·8 mm. latum, demum rubido-brunneum, vix stipitatum, vix vel brevissime (usque 0·2 mm.) stricte vel interdum leviter inflexe rostratum. *Stylus* basi leviter incrassatus. *Stigmata* 3.

Dutch New Guinea : Treub Mountain ; heathy south slope, on slate (schist), 2400 m., 17 Feb. 1913, *Pulle* 1112B (typus, Herb. Hort. Bogor. ; fragm., Herb. Kew.).

North-East New Guinea : Morobe District ; Matap Station, mossy and bushy slope, 1500–1800 m., 13 March 1940, *Clemens* 41023.

This species is not just a smaller *C. atrosanguinea*, its two gatherings, though both poor specimens, exhibiting several clearly distinctive characters.

C. celebica *Kükenth.* in Engl. Bot. Jahrb. 70 : 465 : 1940.

I have now seen the type of this species and no longer doubt that the later described *C. constricta* S. T. Blake is synonymous with it.

Carex eymae *Nelmes*, sp. nov. ; affinis *C. borneënsi* C. B. Clarke, sed glumis brevioribus hispidulis, utriculis dense hispidulis multinerviis breviter rostratis differt.

Caespitosa. *Rhizoma* breve, gracile. *Culmi* erecti vel suberecti, trigoni, 17–48 cm. alti, tenues (0·5–0·75 mm. crassi), basi laeves, superne infra nodos ad angulos scaberuli, basi vaginis aphyllis paucis spadiceis circumdati. *Folia* basilaria et subbasilaria, cum duobus caulinis, culmo plus minus aequilonga, 2–3·5 mm. lata, planiuscula vel revoluta, supra superne scabrida ; *vaginae* foliorum basilarium brevissimae, glabrae vel setulosae, spadiceae, demum fibrillosae. *Spicae* 4–8, interdum singulae sed mediae plerumque inaequaliter binae, superiores 5–18 cm. culmi occupantes, androgynaeceae, erectae vel suberectae, superiores approximatae vel subapproximatae, fastigiatae, inferiores distantes, 1·5–3·5 cm. longae, parte mascula quam pars feminea plerumque multo breviore sed interdum ei aequilonga vel longiore, circiter 1 mm. crassa, parte feminea 2·5–4 mm. crassa, omnino sublaxiflorae, superiores vix vel breviter inferiores longe exserte pedunculatae ; *pedunculi* tenues, glabri vel dense hispiduli. *Bracteae* spicarum inferiorum foliaceae vel setaceae, spica propria longiores vel breviores, bractearum superiorum vaginis breviter vel longe aristatis, superiores breviter inferiores longivaginantes ; *vaginae* plerumque dense sed minute pallide setulosae, spadiceae vel ferruginae, nodis fuscae. *Glumae femineae* oblongo-ovatae vel oblongae, triente apicali triangulari, basi incurvae, superne cymbiformes, apice obtusae, obtusissimae vel sub bilobi-emarginatae, raro subacutae, 2·25–3 mm. longae, 1·4–2 mm. latae, subtranslucentes, basi glabrae vel glabrescentes excepta dense subadpresse hispidulae, ferrugineae, nervosae, marginibus superne enerves, vix vel late albido-hyalinae, demum erosae, nervo mediano prominente, apicem vix vel haud attingente vel excurrente ; *arista* usque 1 mm. longa, marginibus hispidula. *Utriculi*

anguste ellipsoidei vel oblongo-ellipsoidei, sed basi et apice attenuati, trigoni, faciebus planiusculi, 5–5·75 mm. longi, 0·9–1 mm. lati, subcoriacei, multinerves, vix vel anguste marginati, pallide subadpresse hispiduli, substricti, viridi-ferruginei, basi pseudo-stipitati, 0·2–0·4 mm. stipitati, sensim vel subsensim rostrati ; *rostrum* acuminatum, planoconvexum, 1·75–2 mm. longum, anguste marginatum, minute hispidulum, bidentatum ; *os* haud vel vix dorso obliquum ; *dentes* stricti, usque 0·5 mm. longi. *Achaenium* oblongum vel oblongo-ellipsoideum, trigonum, circiter 3 mm. longum, 0·8–0·9 mm. latum, brunneum, brevissime stipitatum, abrupte rostratum ; *rostrum* brevissimum (circiter 0·2 mm. longum), strictum vel subreflexum. *Stylus* basi vix vel subincrassatus. *Stigmata* 3, vel interdum 2.

Celebes : Enrékang, between Angin Angin and Pintealon, forest, 1550–2600 m., 15 June 1937, *Eyma* 482 (typus, Herb. Kew. ; dupl., Herb. Hort. Bogor.).

I was for a time inclined to treat this and *C. clemensii* Kükenth. as varieties of *C. borneënsis*, but further study has led me to accept the three as closely related but distinct species.

C. pseudo-rivulorum *Kükenth.* in Bull. Jard. Bot. Buitenz. sér. 3, 16 : 319 : 1940.

C. rivulorum Ridley in Journ. F. M. S. Mus. 6 : 195 : 1915, non Dunn.

C. breviglumis Ridley in Fl. Mal. Penins. 5 : 183 : 1925.

The type specimen of *C. breviglumis* differs from that of *C. rivulorum* almost only in its shorter glumes. Now, through an intermediate specimen from Singapore, the two plants are seen to be specifically linked together.

C. kinabaluensis *Stapf* in Journ. Linn. Soc. 42 : 183 : 1914.

" Borneo : Mt. Kinabalu ; below Pakapaka cave, 2700 m., under trees. *Gibbs* 4240. Undoubtedly an ally of *C. brunnea*." (Stapf, l.c.).

I was unable to see the type of this species when preparing my Malaysian *Carex* Key, but I placed it, in accordance with its description, with *C. brunnea* and its allies. Recently I examined the type, the only specimen known, at the British Museum, and was very surprised to find that Stapf had made a mistake in describing and figuring it as having 2 stigmas. The styles are really 3-branched, and I consider that the species belongs to a different group of the genus, one which also contains *C. verticillata* Zoll. et Mor. and *C. borneënsis* C. B. Clarke.

C. brunnea *Thunb.* Fl. Japon. 38 : 1784.

[*C. teinogyna* (non Boott)—Kükenth. l.c. 320.]

Sumatra : Atjeh ; Gajolanden, Sangir Valley, upper Blang Kedjeren, on rocks in stream-valley, 1050–1150 m., 19 March 1937, *van Steenis* 9839 ; between Goempang and Kongké on the bank of the Lau Alas among stones, 700 m., 12 March 1937, *van Steenis* 9804.

C. teinogyna Boott is readily distinguished from *C. brunnea* by, among other characters, its extremely long stigmas ; and it is apparently confined to India.

C. brunnea *Thunb.* var. **dolichocarpa** *Nelmes*, var. nov. ; a typo glumis marginibus superne late albo-hyalinis, utriculis 1 mm. stipitatis et 2 mm. rostratis inclusis 5–5·75 mm. longis differt.

Java : Besoeki ; Gendingwaloeh, ravine, not common, 1450 m., 8 July 1916, *Koorders* 42960β ; ibid., Ijang complex, Mt. Argopoero, north-west slope, rain-forest, common, 1800 m., 23 April 1914, *Backer* 13298 ; ibid., Ijang complex, west slope, route Bermi-Taman Hidoep, locally common, along forest path, 1600–1800 m., 13 July 1938, *van Steenis* 10809 (typus, Herb. Hort. Bogor. ; fragm., Herb. Kew.).

Sharp distinctions are not often seen among the components of this extremely polymorphic species, but such long utricles as occur in this Java plant have not been seen by me in *C. brunnea* throughout its extended range from Australia to India.

Carex buruensis *Nelmes*, sp. nov. ; affinis *C. brunneae* Thunb., sed foliis subfiliformibus, inflorescentiis multo brevioribus spicatis, glumis longioribus angustioribus, utriculis angustioribus rostris longioribus, achaeniis angustioribus differt.

Caespitosa. *Rhizoma* breve vel elongatum, gracile, squamis vaginatis spadiceis, circumdatum. *Culmi* erecti vel subcurvati, obscure vel obtuse trigoni 12–28 cm. alti, gracillimi (circiter 0·3 mm. crassi), rhachibus inclusis laeves. *Folia* numerosa, subbasilaria, basilaria ad vaginas aphyllas redacta, plerumque culmis breviora, subfiliformia, crassiuscula ; *vaginae* vaginis aphyllis inclusae, marginibus in fibras tenues reticulatim fissae. *Spicae* 2–4, androgynaeceae, strictae, erectae vel suberectae, superiores approximatae inferiores subapproximatae vel magis separatae, pauci- et sublaxiflorae, subcylindricae, 7–14 mm. longae 2–3 mm., crassae, pedunculatae, inflorescentiam terminalem 2–5 cm. longam eformantes ; *pedunculi* in vaginis omnino inclusi vel ex iis breviter exserti, tenues, laeves. *Bractea* spicae infimae subfoliacea, inflorescentia brevior vel eam aequans, *bracteae* superiores ad glumas aristatas redactae, vaginantes ; *vaginae* rubido-brunneae, inferiores longae, superiores breves. *Glumae femineae* lanceolatae vel oblongo-lanceolatae, cymbiformes, acuminatae, apice acutae vel subacutae, 3–4·5 mm. longae, circiter 1 mm. latae, tenuiter nervosae, pallide rubidae vel pallidae lineolis rubidis maculatae, marginibus interdum inaequaliter albidae, nervo mediano apicem circiter attingente. *Utriculi* elliptica vel ovato-elliptici, plano-convexi vel compressi, 3·5–4·5 mm. longi, 0·8–1 mm. lati, membranacei, angustissime marginati, multinerves, marginibus et basi superne nervis lateralibus paucis parcissime vitreo-setulosi, ceterum glabri, stricti, suberecti, rubido-brunnei vel ferruginei, basi subabrupte in stipitem cuneatum 0·5–0·75 mm. longum angustati, apice sensim rostrati ; *rostrum* acuminatum, compressum, 1–1·5 mm. longum, glabrescens vel marginibus parcissime vitreo-setulosum, bidentulum ; *os* haud vel vix obliquum ; *dentes* breves, demum erosi. *Achaenium* oblongo-ellipticum vel oblongo-ovatum, compresse plano-convexum, 2 mm. longum, 0·8–0·9 mm. latum, erostratum, vix stipitatum, stramineum, demum brunneum. *Stylus* basi haud vel subincrassatus. *Stigmata* 2, utriculo breviora.

Moluccas : North-west Buru (Boeroe), Mt. Fogha (?Togha), on open ridges, 1800–2050 m., end of Feb. 1912, *Stresemann* (II Freiburger

Molukken-Expedition no. 390) (typus, Herb. Lugd.-Bat. ; dupl., Herb. Kew.).

Carex buruensis is one of the most distinctive of the many variants hovering round the periphery of *C. brunnea* Thunb.

C. brevis *S. T. Blake* in Journ. Arn. Arb. 28 : 111 : 1947.

Celebes : Enrékang ; Rante Marío, open ground, 3300 m., 17 June 1937, *Eyma* 753 ; ibid., open bare ground, plateau south-east of summit, locally common, 3400 m., 20 June 1937, *Eyma* 864.

These Celebes gatherings are interesting as coming from an area about mid-way between the other two known localities for the species, Papua and Borneo.

Carex stenura *Nelmes*, sp. nov. ; affinis *C. speciosae* Kunth, sed foliis angustioribus, spicis tenuioribus multo longioribus, utriculis multo minoribus differt.

Caespitosa. *Rhizoma* brevissimum, lignosum. *Culmi* erecti vel obliqui, trigoni, angulis acutis, 15–52 cm. alti, tenuissimi, sublaeves, basi vaginis spadiceis vel fuscis vestiti, demum fibrillosi. *Folia* subbasilaria, plerumque culmo longiora, 2–3 mm. lata, plana vel planiuscula, marginibus interdum revoluta, supra superne scabrida. *Spicae* 1–3, e nodis remotiusculis ortae, infima interdum e vagina basali orta, androgynaeceae, plus minus cylindricae, 3–8 cm. longae, tenues, subdensiflorae, parte feminea 2·5–3 mm. crassa, quam pars mascula multo breviore vel ei aequilonga, plerumque breviter exserte pedunculatae ; *pedunculi* trigoni, angulis acutis, plerumque laeves. *Bracteae* spicarum lateralium foliaceae, culmum excedentes, vaginantes ; *vaginae* ventre membranae. *Glumae femineae* ovatae vel oblongo-ovatae, basi incurvae, superne cymbiformes, apice acutae vel obtusae, circiter 2·5 mm. longae, 2 mm. latae, translucentes, tenues et albido-stramineae, brunneo-nervosae, marginibus superne eroso-cioliolatae, nervo mediano apicem vix vel circiter attingente. *Utriculi* plus minus ellipsoidei sed inferne curvato-acuminati, trigoni, circiter 4 mm. longi, circiter 1 mm. lati, subcoriacei, tenuiter multinerves, anguste marginati, glabri, marginibus superne ciliolato-hispiduli, stricti, patuli, viridi-straminei, basi vix stipitati, apice subsensim rostrati ; *rostrum* acuminatum, subtrigonum vel plano-convexum, breve, glabrescens, subpallidum, brevissime bilobum ; *lobi* circiter 1 mm. longi, marginibus pallidi. *Achaenium* ellipsoideum, trigonum, angulis prominentibus, pallidum, faciebus planiusculum vel concavum, brunneum, circiter 3 mm. longum, circiter 1 mm. latum, inferne acuminatum, subabrupte 0·75 mm. stipitatum, apice rotundatum, abrupte 0·2 mm. rostratum. *Stylus* basi subincrassatus. *Stigmata* 3.

Borneo : Dutch Borneo ; Banjermasin(g), Mt. Pandamaran, on dry serpentine rocks, 1857–58, *Motley* 1222 (typus, Herb. Kew.). " Arch. Ind.", Herb. Waitz.

C. speciosa is a very variable sedge throughout its range from India to Malaysia, and its separation from *C. courtallensis* Nees has not yet been clearly defined. There seems, however, no doubt about the specific distinctness from each, of this very slender Bornean plant.

C. anomocarya *Nelmes*, sp. nov. ; affinis *C. harlandii* Boott, sed foliis angustioribus, glumis longius aristatis, utriculis longius dentatis differt.

Laxe caespitosa. *Rhizoma* breve, estoloniferum. *Culmi* centrales, erecti, obtuse vel acute trigoni, 30–46 cm. alti, inferne 1·5–2 mm. crassi, rhachibus inclusis laeves. *Folia* numerosae, basilaria, plerumque culmum multo superantia, 6–20 mm. lata, plana vel planiuscula. *Spicae* 3–4, erectae, subdensiflorae, terminalis mascula, tenuiter cylindrica, 2·5–5·5 cm. longa, laterales femineae, oblongo-cylindricae, 3·5–8 cm. longae, 6–9 mm. crassae, infima saepe distante excepta cum terminali approximatae et fastigiatae, breviter vel brevissime exserte pedunculatae ; *pedunculi* obscure trigoni, subvalidi, laeves. *Bracteae* spicarum lateralium foliaceae sed superiores minores, culmum excedentes, breviter vaginantes ; *vaginae* subampliatae, ore pallidae et membranaceae. *Glumae femineae* oblongae sed sursum acuminatae, raro oblongo-lanceolatae, basi incrassatae et subincurvatae, ceterae cymbiformes vel planiusculae, apice subtruncatae vel subbilobo-emarginatae, raro subacutae, 3–4·5 mm. longae, 1·5–2·5 mm. latae, sordide albidae, marginibus tenues, translucentes, enerves, apicem versus ciliolatae, vitta mediana trinervi (nervis apice coalitis) et excurrente ; *arista* lata, acuminata, laevis vel marginibus scaberula, 2–10 mm. longa. *Utriculi* contorto-ellipsoidei, superficie irregulari varie concava vel convexa achaenio conformi, subinflati, 7·25–10·25 mm. longi, 2–2·8 mm. lati, coriacei, multinerves, laeves glabri, vix marginati, stricti, demum subpatuli vel patuli, basi spongiosi vix stipitati, apice rostrati ; *rostrum* compressum, 2·5–4 mm. longum, basi subabrupte inflatum, superne vix acuminatum laeve, glabrum, utrinque mediano sulcatum, viridi-marginatum, bidentatum ; *os* non obliquum ; *dentes* lanceolati, 0·75–1·75 mm. longi, sublaeves, pallidi, divergentes. *Achaenium* irregulariter ellipsoideum, contorto-trigonum, 4–5·5 mm. longum, 0·8–2 mm. latum, superne faciebus planiusculum, medio convexum, inferne concavum, angulis medio profunde excavatum, superficie dense sed minute alveolata, abrupte breviter interdum inflexe stipitatum, abrupte vel subabrupte rostratum ; *rostrum* cylindricum, 0·5–1 mm. longum, interdum flexuosum, in apicem pallidum discoideo-annulatum expansum. *Stylus* basi incrassatus. persistens. *Stigmata* 3.

Hainan : Yaichow ; in woods on ravine, March–July 1933, *How* 70387.

Indo-China : Tonkin ; Tam Dam massif, ca. 900 m., Feb. 1923, *Petelot* 1313, partim.

Sumatra : Dolok Singgalang, north of the Toba lake, in thin forest, 1700 m., 25 May 1922, *Lörzing* 8871.

Java: Preanger; Mt. Bèsèr, near Tjidadap, south of Tjibeber, 1200 m., in forest, abundant, 20 June 1923, *Bakhuizen van den Brink f.* 2793 ; Tjadas Malang, near Tjidadap, south of Tjibeber, in damp forest, 1000 m., 1 Oct. 1923, *Winckel* 1692β (typus, Herb. Lugd.-Bat. ; dupl., Herb. Kew.).

The several ways in which this species differs from *C. harlandii*, a species of Hongkong and S. China, give it a quite different facies.

C. wahuensis *C. A. Mey* in Mém. Acad. St. Petersb. 1 : 218, t. X : 1831.

C. erythrolepis Kükenth. in Engl. Pflanzenr. IV, 20 : 628 : 1909.

" Java (Hillebrand ! in herb. musei berol. sine indicatione loci)."

When I was constructing my Key to the *Carices* of Malaysia (Kew Bull. 1946, 5–29) I had not seen the type of *C. erythrolepis*, which was probably destroyed in the Berlin herbarium during the late war. I was therefore very interested to find in the sedge loan from Buitenzorg fruit fragments of the type, which enabled me to amplify Kükenthal's description and then to realise that it agreed with that of *C. wahuensis*, an endemic of the Hawaiian (Sandwich) Islands. I do not know whether Hillebrand collected in Java, but he of course did so extensively in Hawaii, and unless contrary evidence is forthcoming I shall assume that " Java " is a mistake for " Hawaii ", and omit *C. erythrolepis* from my Malaysian revision.

C. lateralis *Kükenth.* in Engl. Pflanzenr. IV, 20 : 639 : 1909.

C. elmeri Kükenth. in Fedde Repert. Spec. Nov. 8 : 326 : 1910.

Sumatra : Palembang ; Air Njeroek, 1400 m., July–Aug. 1916, *Ajoeb* 416.—Determined by Kükenthal as *C. elmeri* Kükenth.

Specimens of *C. elmeri* Kükenth. from Buitenzorg and Leiden, more mature than those at Kew, convince me that *C. elmeri* must be considered synonymous with *C. lateralis*.

C. doniana *Spreng.* var. **cacuminis** *Nelmes*, var. nov. ; a typo culmis multo brevioribus, foliis angustioribus, spicis multo brevioribus, utriculis submajoribus differt.

Celebes : Masámba ; summit of Mt. Kamboeno, 2860 m., common, open country, partly grazed (probably by anoa—the small wild buffalo of Celebes, *Anoa depressicornis*), 28 July 1937, *Eyma* 1395 (typus, Herb. Kew. ; dupl., Herb. Hort. Bogor.).

This looks very different from *C. doniana*, chiefly because of its extremely short stems, 2–4 (12) cm. long, compared with those of the species, which range from 30 cm. to 80 cm. The bracketed figure represents the length of one stem among a considerable number of dwarf ones, checking one's inclination to treat this Celebes plant as a new species.

C. oedorrhampha *Nelmes* var. **microcarya** *Nelmes*, var. nov. ; a typo glumis minoribus, rostris utriculorum vix inflatis, achaeniis interdum obovoideis vel orbiculato-obovoideis multo brevioribus differt.

[*C. olivacea* (non Boott)—Kükenth. l.c. 321].

Sumatra : West coast ; Korinchi Peak, forest, 1750 m., 23 March 1920, *Bünnemeijer* 9138 (typus, Herb. Kew. ; dupl., Herb. Hort. Bogor.) ; ibid., margin of lake, 2020 m., 15 April 1920, *Bünnemeijer* 9476 ; ibid., 19 April 1920, *Bünnemeijer* 9618. Atjeh ; Gajolanden, Losir massif, wet places by stream, 2100–2250 m., 29 Jan. 1937, *van Steenis* 8431.

The warrant for treating this as a variant of *C. oedorrhampha* lies almost wholly in the achene, which departs so radically in length and shape from that of its species—and so surprisingly, seeing that the outward, visible parts of species and variety are almost indistinguishable.

C. finitima *Boott*, Illustr. 1 : 44, t. 112 : 1858.

C. atjehensis Kükenth. l.c. 314.

Sumatra : Atjeh ; Gajolanden, Poetjoek Agoesan, mountain ridge, in undergrowth, 2400–2700 m., 28 Jan. 1937, *van Steenis* 8366.

This record forms a link between the northern (E. Himalaya and W. China) and southern (New Guinea—see Kew Bull. 1949, 385, 391) localities, the only ones previously known of this species.

C. maculata *Boott* in Trans. Linn. Soc. 20 : 128 : 1846.

[*C. pruinosa* (non Boott)—Kükenth. l.c. 317.]

Moluccas : Boeroe (Buru) ; Koentoeroean, 1200 m., 9 June 1921, *Toxopeus* 276.

A still further extension of this species, which was described from a Ceylon specimen, and subsequently found not only in China and Japan but also in Sumatra and Java, where it was also (*van Steenis* 4290, *Docters van Leeuwen-Reijnvaan* 13317) mistaken for *C. pruinosa*.

C. elibates *Nelmes* in Kew Bull. 1937 : 353 : 1937.

C. maculata Boott var. *sanguineo-squamata* Kükenth. l.c. 317.

Sumatra : Atjeh ; Gajolanden, Mt. Losir, on burnt mountain ridges, 2600 m., 7 Feb. 1937, *van Steenis* 8720 ; ibid., Goh Lemboek peak, by a stream in damp mossy forest, 21-22 Feb. 1937, *van Steenis* 9125.

forma *humilior* Kükenth. l.c. 317.

Sumatra : ibid., summit of the middle peak, 3300–3500 m., 2 Feb. 1937, *van Steenis* 8581.

C. elibates has hitherto been known only from its type area in the Malay Peninsula. Van Steenis's Sumatran plant, described by Kükenthal as a variety of *C. maculata*, is slightly larger in some of its parts than typical *C. elibates*, but is obviously the same species, and f. *humilior* is (for me) just a dwarf state of it.

Celebes : Poso, between Boro and Poena, quartz–peat plateau, on sandy path, common, forming tufts, short, 1700–1800 m., 10 Aug. 1937, *Eyma* 1605 ; ibid., on peaty spots, *Eyma* 1616.

Eyma's Celebes specimens are very short-stemmed and narrow-leaved, and the glumes are subacute at the apex. Otherwise they match the type of *C. elibates* and I place them in this species.

Carex petecticalis *Nelmes*, sp. nov. ; affinis *C. spathulatae* (Kükenth.) Nelmes, sed inflorescentiis longioribus, spicis longioribus, utriculis ovatis vel ellipticis brevioribus, rostris brevioribus vix marginatis haud inflexis neque tortis, achaeniis brevioribus differt.

[*C. phacota* (non Spreng.)—Kükenth. l.c. 317.]

Laxe caespitosa. *Rhizoma* curvato-elongatum, lignosum, 2–4 mm. crassum. *Culmi* erecti, trigoni, angulis acutis, 75–120 cm. alti, 2·5–3 mm. crassi, rhachibus inclusis laeves, basi cataphyllis brevibus crassis fusco-rubidis circumdati. *Folia* subbasilaria et caulina, superiora longa sed culmo breviora, 3–11 mm. lata, planiuscula vel marginibus revoluta, inferiora ad vaginas breviter laminatas redacta ; *vaginae* longissimae, culmi trientin infimam vestientes, inferiores dorso saepe vinaceae, ventre membranaceae, in fibras tenues reticulatim fissae. *Spicae* 4–8, cernuae, superiores subapproximatae, inferiores subdistantes, infima excepta fastigiatae, gynaecandrae, plus minus cylindricae, 3–6 cm. longae, parte mascula 3–5 mm. crassa, parte feminea 4·5–7·5 mm. crassa, densiflorae, basi saepe laxiflorae, superiores breviter vel brevissime inferiores longipedunculatae, parte masula brevi vel brevissima, inferiores interdum

apice masculae ; *pedunculi* obtuse trigoni vel subteretes, tenues (0·2–0·3 mm. crassi), laeves. *Bracteae* inferiores foliaceae, culmo longiores, subherbaceae vel setaceae, superiores multo redactae, evaginantes. *Glumae femineae* ellipticae, oblongo-ellipticae, oblongo-obovatae, vel plus minus oblongae, basi incurvae, superne cymbiformes vel planiusculae, apice saepe obtusissime vel plus minus truncatae, interdum subobtusae, 1·75–3·25 mm. longae, 1·1–1·3 mm. latae, fusco- vel atro-rubrae, marginibus superne interdum anguste pallidae, lateribus enerves, vitta mediana trinervis superne subcoalitis ex apice in aristam latam planam acuminatam pallidam sublaevem vel marginibus parce hispidulam 0·25–1·25 mm. longam excurrente. *Utriculi* ovati vel elliptici, plano-convexi vel compresso-subplano-convexi, 2·75–3·5 mm. longi, 1·3–1·9 mm. lati, submembranacei, anguste marginati, utrinque 3–5-nerves, glabri, stricti, demum patuli, cinereo-straminei et lineolis rubidis dense maculati, interdum laete rubido-suffusi, vel superne atro-rubri, superne minute papillosi, apicem versus saepe cinerei, basi plus minus rotundati et vix stipitati, apice acuminati ; *rostrum* inferne acuminatum et compressum, superne subcylindricum, haud vel vix marginatum, 0·5–0·75 mm. longum, plerumque pallidum, subintegrum vel emarginatum ; *os* haud vel dorso subobliquum. *Achaenium* late ellipticum vel suborbiculatum, compresso-biconvexum, 1·5–2 mm. longum, 1·25–1·8 mm. latum, brunneum, basi brevissime pseudo-stipitatum, apice abrupte tenuissime et brevissime (circiter 0·2–0·3 mm. longum) rostratum. *Stylus* brevissimus, tenuis, basi subincrassatus. *Stigmata* 2.

Sumatra : Korinchi Peak, 2190 m., 24 April 1914, *Robinson & Kloss* ; Mt. Talakmau, north-west slope, forest, 2100 m., 23 May 1917, *Bünnemeijer* 795 ; Mt. Singgalang, underwood, near lake, 2800 m., 1 June 1918, *Bünnemeijer* 2907 ; Mt. Korinchi, forest, near river, 2300 m., 10 May 1920, *Bünnemeijer* 10438.

Java : Preanger ; Mt. Papandajan, *Warburg* 2582 ; ibid., Mt. Papandajan, tegal Boeng-broeng, damp ground, common, ± 2300 m., 27 July 1936, *van Slooten* 2622 (typus, Herb. Hort. Bogor. ; dupl. Herb. Kew.) ; ibid., marsh near Tjibeureum-gede, ± 2300 m., 21 Jan. 1930, *van Steenis* 4104a (partim) ; ibid., 2300 m., 27 Dec. 1930, *van der Pijl* 301.

This member of the Malaysian group of sedges which contains also *C. kemiriensis* and *C. spathulata* has been generally misidentified as *C. phacota*.

Carex kemiriensis *Nelmes*, sp. nov. ; affinis *C. petecticali* Nelmes, sed glumis longioribus longius aristatis, utriculis majoribus enerviis dense papillosis differt.

C. teres Boott var. *spathulata* Kükenth. in. Bull. Jard. Bot. Buitenz. sér. 3, 16 : 316 : 1940, partim.

Rhizoma nullum. *Culmi* erecti, trigoni, angulis acutis, 55–108 cm. alti, inferne 2–3 mm. crassi, laeves sed rhachibus angulis parce scaberuli, basi cataphyllis fusco-rubidis paucis crassis circumdati. *Folia* subbasilaria et caulina, superiores culmo longiora, 4·5–7 mm. lata, planiuscula vel marginibus revoluta, inferiora ad vaginas breviter laminatas redacta ; *vaginae* longissimae, culmi trientem infimum vestientes, inferiores dorso

vinaceae vel rubido-nervosae vel pallidae, ventre tenuissimae, membranaceae, pallidae vel aureae, et in fibras tenues reticulatim fissae. *Spicae* 5–6, erectae usque cernuae, infima distante excepta approximatae vel subapproximatae et fastigiatae, gynaecandrae, cylindricae, (1·5) 2–5 cm. longae, parte mascula 2–3 mm. crassa, parte feminea 7–10 mm. crassa, densiflorae, basi interdum laxiflorae, superiores breviter inferiores longipedunculatae, parte mascula brevissima vel partem femineam aequans vel ea longiores ; *pedunculi* obscure trigoni, tenues (0·4–0·5 mm. crassi), laeves, saepe curvati. *Bracteae* inferiores foliaceae, culmo longiores, superiores subherbaceae vel setaceae, multo redactae, evaginantes. *Glumae femineae* elliptico-oblongae vel oblongo-obovatae, planiusculae vel subcymbiformes, marginibus interdum incurvae, apice obtusae vel truncato-rotundatae, 3–3·8 mm. longae, 0·9–1·8 mm. latae, vix subtranslucentes, rubido-brunneae vel atro-brunneae, latere enerves, vitta mediana trinervi nervis superne subcoalitis ex apice in aristam latam planam acuminatam rubido-brunneam laevem vel marginibus parce hispidulam 1–2 mm. longam excurrente. *Utriculi* elliptici, subplano-convexi vel compresso-biconvexi, 3·5–4·5 mm. longi, 1·9–2 mm. lati, membranacei, anguste marginati, enerves vel tenuissime et obscure paucinerves, dense minute papillosi, glabri, stricti, demum patuli, inferne aurei vel straminei, superne fusco-brunnei, basi spongioso-incrassati, truncato-rotundati, abrupte vix vel brevissime stipitati, apice acuminati, brevirostrati ; *rostrum* inferne compressum et acuminatum, superne subcylindricum, haud vel anguste marginatum, 0·5–0·75 mm. longum, fusco-brunneum, subintegrum vel emarginatum ; *os* parvulum, haud vel subobliquum. *Achaenium* late ellipticum vel suborbiculatum, interdum obovatum, compresso-biconvexum, circiter 2 mm. longum, 1·5–1·6 mm. latum, brunneum, basi brevissime pseudo-stipitatum, apice abrupte tenuissime et brevissime (circiter 0·2 mm. longum) rostratum. *Stylus* parvulus, tenuis, basi vix incrassatus. *Stigmata* 2.

Sumatra : Atjeh ; Gajolanden, Mt. Kemiri, east slope, near summit, forest ridge and plateau, damp mountain meadow, 2900–3314 m., 7 March 1937, *van Steenis* 9587 (typus, Herb. Hort. Bogor. ; fragm., Herb. Kew.).

Kükenthal cites 4 gatherings, all van Steenis numbers, from Atjeh, Sumatra, at the end of his description of *C. teres* Boott var. *spathulata*. Only 2 of these were included in the loan of *Carices* from Buitenzorg, and these, in my opinion, represent 2 species. The first cited, *van Steenis* 8746, agrees well with the description of Kükenthal's variety, which I have raised to specific rank, and I choose this as the lectotype. The other of the 2 numbers seen, *van Steenis* 9587, is described above as *C. kemiriensis*, whose larger, nerveless, papillose utricles seem very distinct from those of its allies. The identification of the two cited numbers not seen by me, *van Steenis* 8536, 8657, must remain for the present, perhaps for ever, unknown to me. *C. spathulata* differs from *C. teres* (India) principally in its stouter and shorter spikes, a difference which appears to be constant and which alone gives the two plants a wholly dissimilar appearance.

C. spathulata (*Kükenth.*) *Nelmes*, stat. nov.

C. teres Boott var. *spathulata* Kükenth. l.c. 316.

Sumatra : Atjeh ; Gajolanden, from Lau Alas over the Agoesan crest towards Blang Kedjeren, on the margin of a swamp in ericoid forest on the ridges of the Senoebong mountains, 2500 m., 8 Feb. 1937, *van Steenis* 8746 (typus, Herb. Hort. Bogor. ; fragm., Herb. Kew.).

See note at end of description of *C. kemiriensis* above.

C. dimorpholepis *Steud.* Synops. Cyp. 2 : 214 : 1855.

C. cernua Boott, Illustr. 4 : 171, t. 578 : 1867, non J. F. Gmel.

There is a sheet of this species in the Leiden herbarium labelled "Carex ±hexastachys—bilolepis—teste J. Valckenaer Suringar—Archip. Ind.? —leg.?" The Director of the Rijksherbarium, Leiden, has kindly informed me that there are " no reliable data " about this gathering, so that the occurrence of *C. dimorpholepis* in Malaysia must remain doubtful.

C. divulsa *Stokes* var. **javanica** *Nelmes*, var. nov. ; a typo spicis magis numerosis, inflorescentibus longioribus, glumis femineis oblongo-lanceolatis vel ovato-lanceolatis saepe longe acuminatis differt.

Java: Preanger ; Mt. Papandajan, 1500 m., woods, Feb. 1915, *Ridley* (one, flowering stem only—mounted, and presumably collected, with the plant described next below) (typus, Herb. Kew.).

C. pairaei *F. Schultz* var. **javanica** *Nelmes*, var. nov. ; a typo glumis magis acuminatis apice acutis, utriculis marginibus superne hispidulis differt.

Java : Preanger ; Mt. Papandajan, woods, Feb. 1915, *Ridley* (typus, Herb. Kew.).

The above-described pair of interesting discoveries recalls the controversial question as to how and when these 'outpost', 'bipolar' plants travelled so far from their apparent headquarters. Other examples are *C. echinata* Murr., *C. canescens* L. (*C. buxbaumii* Wahlenb.), and *C. curta* Gooden. on the Australian alps, the last-mentioned also from New Guinea, several such in New Zealand, and others in other countries, some agreeing closely with, others differing more or less from, their 'home' species in the northern hemisphere.

C. monopleura *Krecz.* in Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS, 7 : 35 : 1937.

C. remota L. var. *rochebrunii* (Franch. et Savat.) C. B. Clarke in Hook. f. Fl. Brit. Ind. 6 : 707 : 1894, quoad pl. Sikkim.

C. remota subsp. *rochebrunii* (Franch. et Savat.) Kükenth. in Engl. Pflanzenr. IV, 20 : 234 : 1909, quoad pl. Sikkim.

[*C. rochebrunii* (non Franch. et Savat.)—Nelmes in Kew Bull. 1946 : 7, 29 : 1946.]

There seems no doubt that this Malaysian plant is conspecific with the Sikkim *C. monopleura*, which I had not at hand when drawing up the Malaysian *Carex* Key. The species often has a sterile terminal spike, a very rare occurrence in the *Vigneae*.

A NEW CAREX FROM THE MALAY PENINSULA.

E. Nelmes.

Carex malayana *Nelmes*, sp. nov. ; affinis *C. rhynchachaenio* C. B. Clarke, sed foliis latioribus, utriculis majoribus praecipue differt.

Rhizoma stoloniferum, circiter 1·5 mm. crassum. *Culmi* erecti, 10–24 cm. alti, trigoni, tenues (0·75–1 mm. crassi), inferne laeves, superne angulis scaberuli. *Folia* subnumerosa, basilaria, culmo multo longiores, 5–7 mm. lata, planiuscula, rigida ; *vaginae* spadiceae, demum fibrillosae. *Spicae* 4–6, infima excepta interdum subapproximata contiguae vel approximatae, erectae vel suberectae, 1–3·6 cm. longae, terminalis mascula, tenuis (circiter 1 mm. crassa), laterales femineae vel androgynaeceae, 2–3 mm. crassae, laxiflorae, vix vel breviter pedunculatae ; *pedunculi* trigoni, angulis laeves vel scaberuli. *Bracteae* subfoliaceae, culmum aequantes vel superantes, vix vel breviter vaginantes, superiores minores. *Glumae femineae* oblongo-ovatae vel oblongo-lanceolatae, basi incurvae, superne planiusculae vel cymbiformes, apice acutae vel obtusissimae, 2·75–4 mm. longae, 1·6–1·8 mm. latae, tenuiter nervosae, pallidae, demum brunneae, marginibus inferne late albo-hyalinae, apice eroso-ciliolatae, muticae vel vix mucronulatae. *Utriculi* lageniformes, obscure trigoni, 7–7·5 mm. longi, 1·6–1·8 mm. lati, subcoriacei, multinerves, vix marginati, parce puberuli, stricti, suberecti vel subpatuli, superne virides, inferne straminei, basi vix vel breviter stipitati, apice sensim rostrati ; *rostrum* vix acuminatum, compressum, 2–2·25 mm. longum, bidentulatum ; *ore* haud obliquum ; *dentes* stricti. *Achaenium* oblongum sed inferne acuminatum, trigonum, faciebus inferne concavum, circiter 4 mm. longum, stramineum demum brunneum, stipitatum, apice producto in collum breviter cylindricum 1 mm. longum 0·8–0·9 mm. latum vertice truncatum. *Stylus* brevis, basi incrassatus. *Stigmata* 3.

Malay Peninsula : Pahang ; Gunong Tahan, July 1911, *Ridley* 16340 (typus in Herb. Kew. ; duplum in Herb. Mus. Brit.).

BULBOSTYLIS TRIFIDA (NEES) NELMES.

At the request of Dr. R. Pichi-Sermolli, Istituto Botanico della Universita di Firenze, the following extract from the MS of a paper, "Results of the Vernay Nyasaland Expedition, 1946, Cyperaceae collected by L. J. Brass. By E. Nelmes", is here published. The new combination concerned is required by Dr. Pichi-Sermolli for use in a forthcoming work on his Abyssinian plants. Publication of the full paper, which was prepared some time ago, still awaits the completion of certain other groups by other contributors.

Bulbostylis *C. B. Clarke.*

Bulbostylis trifida (*Nees*) *Nelmes*, comb. nov.

Isolepis trifida Nees in Wight, Contrib. Bot. Ind. 108 : 1834.

Bulbostylis capillaris (L.) C. B. Clarke var. *trifida* (Nees) C. B. Clarke in Hook. f. Fl. Brit. Ind. 6 : 652 : 1893.

Zomba District : Zomba Plateau, alt. 1500 m., June 5, 1946, *Brass* 16247, confined to shallow wet soil on rocky seepage slopes.—Old World tropics and subtropics.

C. B. Clarke, in Hook. f. Fl. Brit. Ind. 6 : 651 : 1893, attributed the genus *Bulbostylis* to Kunth (Enum. Pl. 2 : 205 : 1837), citing the following combinations : *B. barbata* Kunth, Enum. ii. 208, *B. capillaris* l.c. 212, and *B. puberula* Kunth. l.c. 213. Kunth, however, merely suggested that one of his sections of *Isolepis* could be regarded as a separate genus and mentioned *Bulbostylis* as a suitable name. In fact, he treated this name as a synonym in his index by italicizing it, and, following his mention of it (p. 205) in a short description of a section of *Isolepis*, proceeded to describe all the members of the section as species of *Isolepis*. Kunth, therefore, is scarcely the author of *Bulbostylis*, and certainly not the author of the combinations under this name attributed to him by Clarke. It seems unfortunate that "*Bulbostylis* Kunth" has been conserved, against *Bulbostylis* DC (1836), *Bulbostylis* Stev. (1813) and *Stenophyllus* Rafin. (1825).

There is also some doubt as to the identity of *Scirpus capillaris* L. Linnaeus gives the distribution as "Virginia, Aethiopia, Zeylona", but his "type" specimen probably came from Clayton, from America. It certainly agrees with the American "B. capillaris", which has obtuse, pubescent glumes, and not with the Indian plant, the glumes of which are acute and glabrous.

The Brass material from Nyasaland is a good match of the Indian plant, and, pending a full investigation of the problems briefly touched upon above, is treated as a distinct species based on *Isolepis trifida* Nees.—E. Nelmes.

Trees found in the Transvaal*.—This interesting and useful little booklet on the trees found in the Transvaal has been published by the Boy Scouts' Association in the Transvaal for the use of boy scouts. Short, popular descriptions of 53 trees are given accompanied by illustrations which include habit pictures to assist in the identification of the trees from their shape. Each description is headed by the botanical name followed by the common names in English, Afrikaans and Zulu, and an indication as to whether the tree described is a native of South Africa or introduced. An index giving the common and botanical names is also provided. The booklet forms a helpful and handy little guide to the recognition of many of the trees and shrubs which the boys are likely to meet with in their scouting activities in the veld.

H. S. Marshall.

*By M. Bolton. Pp. iv+55. Johannesburg : The Boy Scouts' Association. 1949. Price 2/6.

A CORRECTION

In accordance with Article 70, Note 2 and Rec. XLIV of the International Rules of Nomenclature, the specific names '*nepheliphila*' and '*poiphagorum*' which appear in Kew Bull. 1948, pp. 140 and 143 respectively, should be spelt '*nephelophila*' and '*poophagorum*'. These spellings will be adopted in the Index Kewensis.

N. L. Bor.

PLANTS OF THE CAMBRIDGE EXPEDITION, 1947-1948 : I.

J. P. M. Brenan.

From December 1947 to April 1948 the Cambridge Expedition, under the leadership of Dr. (now Professor) P. W. Richards, was carrying out investigations, principally in the rain-forest, in Southern Nigeria and the British Cameroons. The other members of the Expedition were Dr. G. C. Evans, Dr. E. W. Jones, and the present writer; Mr. C. F. A. Onochie, of the Nigerian Forestry Department, was seconded to the Expedition, and Mr. R. W. J. Keay of the same Department paid us short visits from time to time.

Over 1300 numbers of phanerogams were collected, and to save confusion, all gatherings, whoever collected them, were with very few exceptions given the writer's own serial numbers.

Most of the time was spent in Okomu Forest Reserve, about 20 miles east of Benin City ; but during this time the Expedition as a whole, or individual members of it, made short visits to other localities. For about the last month the Expedition, except Dr. Evans, was in the British Cameroons.

The most important centres for collecting, and the approximate dates of the Expedition's stay at each, are as follows :—

6.12.1947–30.12.1947 : Okomu Forest Reserve, Nigeria.
31.12.1947– 6. 1.1948 : Idanre, Nigeria.
8. 1.1948–29. 2.1948 : Okomu Forest Reserve, Nigeria.
2. 3.1948– 8. 3.1948 : Calabar and neighbourhood, Nigeria.
10. 3.1948–21. 3.1948 : Banga and Bopo, S. Bakundu Forest Reserve, British Cameroons.
22. 3.1948– 4. 4.1948 : Buea, Mimbia, and the Cameroon Mountain, British Cameroons.

In addition to the above, some collecting was done on a short visit to Sapoba, and a good deal on occasional visits to Ibadan.

Other aspects of the Expedition's work will be written up elsewhere, but the systematic botanical side will be dealt with in periodical papers under the same title as at the head of this one.

Most of the plants collected by the Cambridge Expedition are represented by several sets, which have been or will be distributed to various herbaria. To save space the following abbreviations for herbaria will be used :—

K=Royal Botanic Gardens, Kew.
O=Imperial Forestry Institute, University of Oxford.
FHI=Forest Herbarium, Forestry Department, Ibadan, Nigeria.
BM=British Museum (Natural History).
P=Paris.
CA=Cambridge University.
B=Brussels.
A=East African Agricultural and Forestry Research Organisation, Amani, Tanganyika Territory.
CO=Coimbra.

As mentioned above, the Cambridge Expedition spent the New Year at Idanre (31.12.1947–6.1.1948), during which time more than a hundred numbers were collected ; these have been worked out separately and before the rest of the collections, and the results given in the present paper.

We hope to publish elsewhere a fuller account of these little-known but very attractive hills. Meanwhile it must be sufficient to say that they are a small but complex range of low mountains, rising to more than 900 m., and situated in the Akure Division of Ondo Province in Southern Nigeria some 20 miles E. of Ondo. Out of the earth have pushed grey bare rounded domes of granite on whose inhospitable flanks shreds of forest and fragmentary mats of *Trilepis* and grass lead a precarious existence. On the lower part of these domes seasonal trickles ooze, dry alas when we were there, but during the rains nourishing a wealth of short-lived herbs. In the deep valleys between the various peaks, where there is shelter and depth of soil, forest occurs, though merely as tattered relics amid the insatiable plantations.

Although these hills are isolated in the rain-forest zone, their endemic element is a low one, though there is evidence of several very distinct varieties, to be described in another paper, being restricted to Idanre. Two very distinct new species described in the present paper appear to be endemic, and Mr. C. E. Hubbard has described a new species of grass, *Panicum gemmeum*, in Kew Bull. **1949,** 361 (1949), from specimens collected by the Expedition at Idanre. But the case of a new *Ipomoea*, to be dealt with elsewhere, which appeared to be a good Idanre endemic until several specimens were unearthed from Uganda, teaches you caution in making over-hasty generalisations about endemism in Africa !

Cruciferae

Rorippa humifusa (*Guill. et Perr.*) *Brenan*, comb. nov.

Nasturtium humifusum Guill. et Perr., Fl. Seneg. Tent. **1,** 19 (1831) ; Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 92 (1927) ; A. Chevalier, Flore Vivante de l'A.O.F. **1,** 213 (1938).

Nasturtium benuënse Hutch. et Dalz. *l.c.*, et in Kew Bull. **1928,** 26 (1928), *synon. nov.*

Oyo Province, Ife Division : Awaran River, 4 miles on the Ife side of Ifetedo, 10 Feb. 1948, *J. P. M. Brenan and C. F. A. Onochie* 8983 (K, FHI, BM, P, CA, B, A, CO) :—annual herb, rosettes of leaves ± appressed to ground ; flowers very small, in small, short racemes from centre of rosette ; growing on damp exposed sand by a small stream, with *Ageratum conyzoides* ; plants small and flowering on open sand by water, larger and fruiting among taller vegetation further from water's edge. Ondo Province, Akure Division : Deep valley between Olurere and Orosun peaks, alt. 380 m., 5 Jan. 1948, *J. P. M. Brenan and Dr. E. W. Jones* 8733 (K, FHI) :—annual herb, almost stemless ; leaves yellowish-green ; flowers greenish ; a weed in a sandy stream-bed, very scattered.

Hutchinson and Dalziel separated *N. benuënse* from *N. humifusum* by the shorter leaves, the " inflorescence terminating leafy shoots ", the shorter oblong-lanceolate fruit and very short style. By the Awaran River, small plants resembling *N. benuënse* in size were on the open sand most recently laid bare by the falling waters of the stream, while further away, among other vegetation, the plants become larger and comparable with typical *N. humifusum* in size. Pod-size and style-length vary greatly, even in single gatherings ; thus pods of plants under the number *Welwitsch* 1197 (Angola) vary between 4 and 10 mm. in length. Every intermediate can be found between the short pods of *N. benuënse* and the long pods of *N. humifusum*. The alleged difference in the position of the inflorescence is misleading : the difference in appearance is due to *N. benuënse* being " caulescent ", with the internodes of the main stem rather longer than usual. Some of the Awaran River plants are similarly " caulescent ", while a combination of extreme development of " caulescence " with large size of leaves is shown by *Irvine* 1756 (Gold Coast).

It seems that we can no longer maintain *Nasturtium* R. Br. as a genus distinct from *Rorippa* Scop. For a discussion of the reasons see Hylander in Bot. Notiser **1950,** Häfte 1, 1–13 (1950), also Mansfeld in Fedde, Repert. **46,** 117 sqq. (1939).

Lecythidaceae

Napoleona cuspidata Miers in Trans. Linn. Soc., Ser. 2, **1,** 10 (1875) ; Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 203–4 (1927) ; Knuth in Engl. Pflanzenr. **4.219,** 70 (1939).

Napoleona miersii Hook. f., Bot. Mag., Ser. 3, **47,** t. 7199 (1891) ; Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 203–4 (1927) ; Knuth in Engl. Pflanzenr. **4.219,** 69 (1939), *synon. nov.*

Napoleona imperialis P. Beauv. var. *cuspidata* (Miers) Engl., Pflanzenw. Afr. **3** pt. 2, 660 (1921).

Ondo Province, Akure Division : Lower slopes of Carter's Peak, Idanre, alt. about 490 m., 1 Jan. 1948, *J. P. M. Brenan, Dr. E. W. Jones, R. W. J. Keay and Dr. P. W. Richards* 8646 (K, FHI, O, P, BM, CA) :— cauliflorous tree about 6 m. high with bushy crown ; leaves subcoriaceous, deep green and glossy above, paler beneath, midrib prominent, pale green ; flowers borne in leaf-axils and on woody cushions to base of trunk ; petals yellowish-brown with purple radiating lines ; stamens and corona white ; stigma pinkish ; in low forest among rocks.

I can detect no differences between the types of *N. cuspidata* and *M. miersii* except for the longer acumen of the former, and the development of glandular teeth on either side of its base. These characters are so variable, even on a single gathering, and appear to be correlated neither with one another, nor with the habitat of the plant, that I feel compelled to amalgamate the two species.

Dissotis idanreënsis *Brenan*, sp. nov. ; propter calycis tubum squamis squarrosis apice paucisetosis laxiuscule vestitum aliter glabrum prope *D. lambii* Hutch. et *D. grandifloram* Benth. ponenda ; habitu excelso fruticoso, ramulis densissime et appresse setuloso-pubescentibus, indumento foliorum ut videtur multo densiore, squamis calycis plerumque longioribus ab ambabus plane differt.

Frutex usque ad 3 m. altus, virgate ramosus. *Ramuli* juniores plus minusve tetragoni, haud alati, densissime et appresse setuloso-pubescentes, seniores grisei, tarde glabrati, cortice longitudinaliter striato-rimoso obtecti, internodiis ramulorum sterilium abbreviatis circiter 4–10 mm longis, eis ramulorum floriferorum elongatis ; nodi annulo setarum 4–11 mm. longarum ornati. *Folia* inter tempus sitis decidua, anthesi nondum omnino expansa tunc circiter 2–3·5 cm. longa, 1–1·8 cm. lata ; folia matura (e plantis in Hort. Kew. cultis descripta) ovato-elliptica usque oblonga, circiter 5·5–9·5 cm. longa, 2·5–5·1 cm. lata, apice subacuta vel acuta basi rotundata vel attenuata, utrinque pilis griseis satis mollibus ad margines adversis et sursum (ad folii apicem) curvatis sed vix appressis dense vestita, nervis primariis longitudinalibus 3–7 supra impressis subtus prominentibus venis transversis inconspicuis conjunctis ; petiolus brevis, circiter 1·2–1·5 cm. longus, more ramulorum vestitus, sed etiam setis appressis. *Paniculae* terminales, amplae, usque ad circiter 30 cm. longae et 20 cm. latae, aphyllae vel fere aphyllae, internodiis axis circiter 4·5–7·5 cm. longis. *Bracteae* caducissimae, ovatae, glabrae, apice acuto penicillatae, 4–6 mm. longae, basi circiter 3 mm. latae. *Pedicelli* brevissimi, 1–2 mm. longi, setoso-pubescentes. *Calycis tubus* oblongus vel ellipsoideus, basi elongato rotundatus, 8–9 mm. longus, 4–5 mm. latus, extra squamis breviter quadratis usque oblongis 0·5–2 mm. longis 0·4–0·75 mm. latis squarrosis rigidis apice setis 3–6 albidis radiatis inaequalibus 0·5–2·5 mm. longis coronatis laxiuscule vestitus, aliter glaberrimus ; lobi 5, reflexi, lanceolati, circiter 1·5 cm. longi, 3·5–4 mm. lati, undulati, glabri, margine sparse ciliolati, apice in coronam setularum terminantes, inter anthesin caduci ; lobi totidem squamis angustis 5 mm. longis corona setularum ornatis alternantes. *Petala* rubro-violacea, late elliptica, 2·5–3 cm. longa, 1·6–1·7 cm. lata, basi cuneata, apice abrupte subacuta et in setulam deflexam desinentia. *Staminum filamenta* arcuata, circiter 1·1–1·2 cm. longa ; connectivum staminum majorum 2 cm. longum, arcuatum, basi in appendiculum 1 mm. longum bifidum et rectum productum, connectivum staminum minorum 4 mm. longum, basi in appendiculum 0·5 mm. longum bifidum et uncinatum productum ; antherae majorae 1·1 cm. longae 1·5 mm. crassae, minorae 9 mm. longae 1 mm. crassae. *Pars libera ovarii* glabra, superne 5-angulata et circa basin styli corona setularum ornata. *Stylus* 2 cm. longus, arcuatus, glaber. *Calyx fructifer* paulum accrescens, usque ad 13 mm. longus, 8 mm. latus. *Capsula* superne quinquevalvata, setis apicalibus persistentibus. *Semina* oblique reniformia, straminea, verruculosa, 0·6 mm. longa, 0·5 mm. lata.

Ondo Province, Akure Division : Near foot of Carter's Peak near

Idanre, alt. about 460 m., 3 Jan. 1948, *J. P. M. Brenan and R. W. J. Keay* 8694 (typus in Herb. Kew, FHI, P, B) :—virgately branched almost leafless shrub up to about 3 m. high ; stems grey ; leaves mid-green above, three nerves impressed, pale green beneath with nerves prominent ; calyx-tube green ; scales green to purple, apical setae hyaline ; petals vivid magenta ; bases of stamens yellow, connective with red patch at base ; larger anthers purple with pink backs, smaller lilac with whitish backs ; growing on dry rocks and in *Trilepis* (*Catagyna*) mats.

This very handsome *Dissotis* produces its large magenta flowers during the dry season when the plant is nearly or quite leafless. A second smaller species, also shrubby, grows with *D. idanreënsis*, but was long past flowering when we were there. Seeds of both were brought back to Kew, and the mature leaves of the present species, which had disappeared when we were at Idanre, are described from these cultivated plants. The second species is being described elsewhere as a new variety of *D. rotundifolia* (Sm.) Triana.

Euphorbiaceae

Phyllanthus nigericus *Brenan*, sp. nov. ; *P. boehmii* Pax et *P. dekindtii* Hutch. affinis, ab hoc foliis majoribus basi apiceque rotundatis, stipulis longioribus magis attenuato-filiformibus, stylis basi haud connatis, glandulis disci in floribus masculis papillis 4–5 tantum ornatis, ab illo thecis antherarum rima horizontali dehiscentibus necnon glandulis disci in floribus masculis papillosis nec laevibus, ab ambabus seminibus dorso lineis 9–10 nec 15–17 notatis et stigmatibus multo minoribus differt.

Herba verisimiliter annua, glaberrima, caulibus basi plus minusve decumbentibus et brunneis deinde erectis vel flexuosis tenuibus subteretibus circiter 1 mm. diametro superne plus minusve purpurascentibus et ramos paucos floriferos patentes 1·5–6 cm. longos singulatim emittentibus. *Folia* oblongo-elliptica usque oblongo-obovata, 5–9 mm. longa, 3–5 mm. lata, tenuia, apice rotundata vel ea in ima rami parte plus minusve mucronata, basi rotundata, supra flavo-viridia, subtus pallide glauco-viridia, marginibus saepe purpurascentibus, costa supra obscura subtus prominula, nervis lateralibus utrinque 3–4 subtus tantum aegre cernendis ; stipulae lineari-filiformes, circiter 1·5 mm. longae. *Flores* monoeci, masculi minimi ex axillis rami inferioribus singuli vel bini, foeminei majores ex axillis superioribus singulatim exorientes. *Flores masculi* 0·5–0·75 mm. longe pedicellati ; tepala 5, elliptico-suborbicularia vel suborbicularia, concavo-convexa, apice rotundata, circiter 0·7 mm. longa et lata ; disci glandulae 5, papillis 4–5 ornatae ; stamina 3, filamentis in columellam circiter 0·3 mm. altam omnino connatis, antheris ita apice ut videtur sessilibus, thecis rima brevi transversa dehiscentibus. *Flores foeminei* 1–1·5 mm. longe pedicellati ; tepala 5, breviter oblonga, apice rotundata vel aliquantulum cucullata, circiter 1·5 mm. longa et 1 mm. lata ; discus crenis brevibus 9 ; ovarium depresso-subglobosum, lobis laevibus haud papillosis ; styli perparvi, 0·2 mm. alti, liberi, bifidi, erecto-patentes. *Fructus* pedicellis 2·5 mm. longis suffulti, subnutantes, tepalis persistentibus accrescentibus tunc

2·5 mm. longis 1·5 mm. latis medio viridibus late albo-marginatis ; capsula circiter 2 mm. diametro, trilobata, laevis. *Semina* pallide brunnea, dorso lineis tenuibus longitudinalibus 9–10 notata.

Ondo Province, Akure Division : In a wet flush with short vegetation near the foot of Carter's Peak near Idanre, alt. about 490 m., 3 Jan. 1948, *J. P. M. Brenan and R. W. J. Keay* 8693 (typus in Herb. Kew., FHI) :—annual herb ; stems decumbent at base, slender, purplish above; leaves yellow-green above, pale glaucous-green beneath ; fruits drooping; perianth-segments pale green in centre, with white margins.

Although a Nigerian plant, the closest affinity of *P. nigericus* is not with any of the other *Phyllanthi* of this region but with *P. boehmii* Pax of East Africa and with *P. dekindtii* Hutch. from Angola. The distinctions between *P. nigericus* and *P. boehmii* are clear and definite. Unfortunately all the material of *P. dekindtii* that I have seen is some fragments of *Teuscz* 38 and *Dekindt* 273 ; they are so exiguous as to make it difficult to obtain a clear picture of *P. dekindtii*. *Teuscz* 38 clearly shows the styles connate at the base, while this character is not clear in the Dekindt specimen. Also, neither of the fragments shows seeds ; the seeds of both *P. boehmii* and *P. dekindtii* are described (Fl. Trop. Afr. **6** (**1**), 719 : 1912) as being marked with about fifteen lines down the back and those of *P. boehmii* are certainly quite distinct in this character from those of *P. nigericus* ; I have therefore had to rely entirely on Hutchinson's description at this point. However, the number of lines does seem, within narrow limits, to be very constant for each species. It is thus clear that the status and specific characters of *P. nigericus* must to some extent depend on further knowledge and better specimens of *P. dekindtii*.

In the key to *Phyllanthus* in Hutchinson and Dalziel, Fl. W. Trop. Afr. **1,** 290 (1928), *P. nigericus* comes into that section including species **11**–13, with flowering branches not fasciculate, 5 tepals in both sexes, and 3 wholly connate stamen-filaments. As this part of the key is misleading is some important points, and *P. nigericus* has to be added, the following substitute is suggested, to follow on beneath the line starting " Sepals of both sexes 5 . . . . " :—

Ovary prominently warted ; curved back of seed marked with 12–14 fine longitudinal ridges ; leaves oblong ; ♂ flowers 2–3 together in lower leaf-axils of branches, ♀ solitary in upper axils ; disc of ♀ flower stellate with 5 deep lobes ; styles very short, deeply bifid *P. niruroides* Muell. Arg.

Ovary smooth ; curved back of seed marked with 5–10 longitudinal ridges :

Tepals in fruit 2·5 mm. long, ± embracing and subequalling the ripe fruit ; back of seed with 9–10 faint longitudinal ridges ; plant with few (up to 10) lateral branches ; flowers arranged as in *P. niruroides* ; anther-thecae horizontally dehiscing ; disc of ♀ flowers shallowly 9-crenate ; styles very short, deeply bifid at apex . . . . . *P. nigericus* Brenan

Tepals in fruit 0·75–1·5 mm. long, scarcely embracing and much shorter than the ripe fruit ; back of seed with 5–7 more prominent longitudinal ridges ; plant normally profusely branched :

Disc of ♀ flowers annular, not lobed ; stigmas quite sessile, closely packed into a minute circle at top of ovary, each stigma when viewed from above appearing reniform with an emarginate apex ; anther-thecae dehiscing vertically ; ♂ flowers 1–2 together in lower axils of flowering branches, ♀ solitary in upper axils . . . . . *P. sublanatus* Schumach. et Thonn.

Disc of ♀ flowers stellate with normally 5 deep radiating lobes ; styles short but distinct, deeply bifid at apex, not forming a closely packed circle at the top of the ovary ; anther-thecae with markedly oblique dehiscence ; one ♂ flower together with one ♀ flower in each axil

P. amarus Schumach. et Thonn.

While investigating the affinities of *P. nigericus*, I found considerable difficulty in distinguishing *P. amarus* Schumach. et Thonn. and *P. sublanatus* Schumach. et Thonn. Through the courtesy of the Botanical Museum at Copenhagen, the type-specimens of both these species were received on loan. These showed that the two were perfectly distinct, but that *P. sublanatus* had been much misinterpreted, and it seems worth while giving a revised synonymy and distribution for this species.

Phyllanthus sublanatus Schumach. et Thonn., Beskr. Guin. Pl., 420 (1827) ; Hutchinson in Dyer, Fl. Trop. Afr. **6** (**1**), 715 (1912), excl. spec. Ansell. ; Hutchinson et Dalziel, Fl. W. Trop. Afr. **1,** 291 (1928), excl. spec. *Ansell.* et *Dalz.* 1360.

Phyllanthus odontadenius Muell. Arg. f. *ramosus* [" ramosa "] Beille in Mém. Soc. Bot. France, Mém. **8,** 56 (1908).

Phyllanthus odontadenius Muell. Arg. var. *ramosus* (Beille) Beille ex A. Chev., Études Fl. Afr. Centr. Franç. **1,** 269 (1913), pro synon. *P. amari* Schumach. et Thonn.

[*Phyllanthus amarus* (non Schumach. et Thonn.) A. Chev., Études Fl. Afr. Centr. Franç. **1,** 269 (1913), quoad syn. *P. odontadenius* var. *ramosus* et spec. *Chev.* 9326 ; Hutchinson in Dyer, Fl. Trop. Afr. **6** (**1**), 717 (1912), quoad synon. et spec. idem (errore " 8326 ")]

[*Phyllanthus microdendron* (non Welw. ex Muell. Arg.) A. Chev., Expl. Bot. Afr. Occ. Franç. **1,** 557 (1920).]

French Sudan. In sandy cultivated ground, Sikasso, 6 May 1899, *A. Chevalier* 804 (K).

Sierra Leone. Rather wet place in the open laterite plateau, Buyabuya, Scarcies River, 8 Feb. 1892, *G. F. Scott Elliot* 4267 (K). Weed, at Rokupr, 25 Apr. 1949, *H. D. Jordan* 228 (K). Same locality, 27 Apr. 1949, *H. D. Jordan* 239 (K).

Gold Coast. Without precise locality, *Thonning s.n.* (Herb. Haun.).

Nigeria. Onitscha Province, 1911, *N. W. Thomas* 622 (K). Abinsi, a common weed, 12 Nov. 1912, *J. M. Dalziel* 763 (K).

Lower Shari. Korbo, S. of Baguirmi, 25–28 July 1903, *A.Chevalier* 9326 (K).

The epithet of this species is most unfortunate and misleading. The type-specimens are quite glabrous, and I can only assume that Schumacher and Thonning's description of the leaves as " glabris demum sublanatis " was due to some error of observation. The " slightly woolly-pubescent " leaves of *P. sublanatus* were used as a key-character even as recently as the Flora of W. Tropical Africa ; no specimen of *P. sublanatus* that I have examined is anything but quite glabrous, though the mould of poorly dried specimens of *P. amarus* and *P. sublanatus* has repeatedly done duty for the elusive and alas imaginary pubescence.

The Ansell specimen collected at Accra and cited under *P. sublanatus* in the Floras of Tropical and West Tropical Africa in fact belongs to *P. amarus*, as does *Dalziel* 1360, given under *P. sublanatus* in the last-named work.

Finally, *P. odontadenius* Muell. Arg. f. *ramosus* Beille has to be transferred in synonymy from *P. amarus* to *P. sublanatus*.

Caesalpiniaceae

Macrolobium obanense Baker f. in Cat. Talbot Nig. 28 (1913) ; Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 346–7 (1928).

Ondo Province, Akure Division : Orosun Mountain, near Idanre, alt. about 550 m., 2 Jan. 1948, *J. P. M. Brenan, Dr. E. W. Jones, R. W. J. Keay and Dr. P. W. Richards* 8669 (K, FHI, O, P, BM, CA, B) :—small tree about 6 m. high ; bark smooth, dark grey ; crown rounded, with arching branches ; leaflets subcoriaceous, deep green and glossy above, paler green beneath with prominent venation ; inflorescences long, pendulous, on shoots with reduced leaves arising from older twigs ; bracteoles pale green with brownish pubescence ; calyx greenish-white ; petals and stamens white ; in high forest with *Khaya grandifoliola*, *Sterculia tragacantha*, *Celtis*, *Ricinodendron*, *Uvariodendron*, etc., frequent, ascending to 760 m. alt.

M. obanense has been previously found in Nigeria in the Oban and Upper Cross River areas, and at Ululubu in Asaba Division of Benin Province. The present station is the most westerly known for this very local and distinct species, though Aubréville, Flore Forest. Côte d'Ivoire, **1,** 236 (1936), records a " *Macrolobium aff. obanense* " from the Ivory Coast which may well be our plant.

Papilionaceae

Bowringia mildbraedii Harms in Engl. Bot. Jahrb. **49,** 432 (1913) ; Baker f., Leg. Trop. Afr. 592 (1929).

Ondo Province, Akure Division : Orosun Mountain near Idanre, alt. 610 m., 2 Jan. 1948, *J. P. M. Brenan, Dr. E. W. Jones, R. W. J. Keay and Dr. P. W. Richards* 8677 (K, FHI) :—slender climber to about 3 m. ; stems green ; leaves papery, pale green and rather glossy on both sides,

venation prominent beneath ; fruits dark brown, with a single dangling scarlet seed ; on edge of low deciduous scrub on rock slope. Near the rest-house at Idanre, alt. 460 m., 4 Jan. 1948, *Bayo* 8716 (K, FHI, O, P, BM, CA, B) :—slender-stemmed shrub scandent over a *Dracaena* tree ; stems slender, tough, green ; leaves papery, mid-green and somewhat glossy above, paler green and somewhat glossy beneath with prominulous venation, margins undulate ; fruit widely boat-shaped, brownish-black, gaping to expose 1 (–2) vivid scarlet glossy seeds attached to the suture.

The genus *Bowringia* has an interesting distribution : besides our West African species there is one other from China and (according to Harms, *l.c.*) Borneo. The genus is omitted from the Fl. W. Trop. Afr. In the generic key in this work *Bowringia* comes into that group of the tribe *Sophoreae* with unifoliolate leaves, with the genera *Haplormosia*, *Leucomphalus* and *Baphia*. From all these *Bowringia* may be easily separated by the combination of a cup-shaped very shortly toothed calyx, anthers much shorter than their filaments, and a short 1 (–2)-seeded pod. In fruit this is an ornamental plant, as the scarlet seeds remain attached for some time after the pod has started to gape widely open.

B. mildbraedii has been recorded previously from the French Cameroons and French Equatorial Africa. The above is not the first occasion on which it has been collected in Nigeria ; the following earlier gathering from Nigeria is in Herb. Kew. : Onitsha Province, Onitsha Division : Onitsha, 3 Sept. 1909, *Comm. A. H. Unwin* 76.

Ulmaceae

Celtis scotellioides A. Chev. in Bull. Soc. Bot. France, **61,** Mém. **8e,** 299 (1917), et Expl. Bot. Afr. Occ. Franç. **1,** 590 (1920).

[*Celtis prantlii* (non. Priem. ex Engl.) Rendle in Prain, Fl. Trop. Afr. **6** (**2**), 8 (1916) ; Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 423 (1928) ; Aubréville, Fl. Forest. Côte d'Ivoire, **1,** 28 (1936).]

Celtis crenata A. Chev., Expl. Bot. Afr. Occ. Franç. **1,** 588 (1920) *nomen nudum.*

Celtis rendleana G. Tayl. in Exell, Fl. S. Tomé, 302 (1944).

Ondo Province, Akure Division : In deep valley between Olurere and Orosun peaks, alt. about 380 m., 5 Jan. 1948, *Dr. E. W. Jones and J. P. M. Brenan* 8718 (K, FHI, O, P, BM, CA) :—small tree about 3·6 m. high ; twigs green ; leaves subcoriaceous, deep green and rather glossy above with three impressed nerves, paler green beneath ; fruits rhomboid-ellipsoid, green ; by a stream-bank through open disturbed forest.

Dr. G. Taylor has pointed out (*l.c.*) that the name *Celtis prantlii* was misapplied in the Flora of Tropical Africa to a widespread species on the mainland of West Africa, whereas the type of *C. prantlii* belongs to the species described in the Flora as *C. insularis* Rendle. He therefore proposed a new name, *C. rendleana*, for the mainland species. Unfortunately

this name cannot stand since there is an earlier valid name for the species—*C. scotellioides* A. Chev. ; Chevalier's description and a sheet of the type-number (*Chevalier* 21459, from the Ivory Coast) at Kew agree excellently, and there can be no question of their identity with *C. rendleana*.

Hippocrateaceae

Salacia dalzielii Hutch. et M. B. Moss in Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 451, 453 (1928) et in Kew Bull. **1929,** 22 (1929).

Salacia macrocarpa Welw. ex Oliv., Fl. Trop. Afr. **1,** 373 (1868), non Korth. in Flora **31,** 579 (1848).

Salacia macrocarpa Welw. ex Oliv. vars. *typica* Loes., *latifolia* Loes., *grandiflora* Loes. in Engl. Bot. Jahrb. **44,** 166 (1910).

Salacia euryoides Hutch. et M. B. Moss in Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 451, 453 (1928) et in Kew Bull. **1929,** 21 (1929).

Ondo Province, Akure Division : Near the rest-house at Idanre, alt. about 460 m., 31 Dec. 1947, *R. W. J. Keay* 8752 (K, FHI, O, P, BM) :— climbing shrub ; older stems purplish-brown with dense paler brown lenticels ; leaves stiffly papery, glossy above ; petals yellowish ; ovary and bases of filaments green ; in low scrub.

Salicia macrocarpa Welw. ex Oliv., *S. dalzielii* and *S. euryoides* are maintained as distinct species by Hutchinson and Dalziel in Fl. W. Trop. Afr. Examination of the type-specimens of these convinces me that there are no characters of specific importance to separate them.

The earliest name for the species when amalgamated, *S. macrocarpa* Welw. ex. Oliv., is unfortunately a later homonym of a Bornean species, *S. macrocarpa* Korth., and therefore must not be used.

The next two specific names referring without doubt to our plant, *S. dalzielii* and *S. euryoides*, were published simultaneously. Of these two I choose *S. dalzielii*, as the type-specimen is in better condition, having more flowers expanded.

There are, however, two other specific names, both earlier than *S. dalzielii*, which may refer to the latter species, but the evidence is in my opinion not sufficiently strong to justify their adoption at present. The first is *S. angustifolia* Scott Elliot in Journ. Linn. Soc., Bot. **30,** 75 (1895), which appears to differ from *S. dalzielii* only in the strikingly lanceolate leaves. Loesener, in Engl. Bot. Jahrb. **44,** 166 (1910), considered it a variety of *S. macrocarpa* Welw. ex Oliv., but I agree with Hutchinson and Dalziel that the evidence is not sufficient. Unfortunately *S. angustifolia* is still represented only by the type-specimen, which was collected at Limba in the Bafodeya highlands in Sierra Leone, and more material of this is much desired.

The second name concerned (omitted in Fl. W. Trop. Afr.) is *S. doeringii* Loes. in Engl. Bot. Jahrb. **44,** 166 (1910). I have not seen the type of this—*Doering* 265, which was collected near Atakpame in Togo.

Loesener admits that it may be only a variety of *S. macrocarpa* Oliv., but describes it as erect. This plant should be observed and re-collected in the type-locality.

It is possible to sort the material that I have here grouped under the name *S. dalzielii* into two divisions, one having somewhat larger flowers than the other, but apparently differing in no other way, possibly varietally distinct but certainly not specifically. In view of the small number of specimens and the possibility that the name *S. dalzielii* may have to be supplanted in the future, it seems wiser merely to note the apparent existence of these forms, and not to give them names. The exact synonymy is as follows.

(a) Petals 4·5–5 mm. long : *S. dalzielii* Hutch. et M. B. Moss, *sens. strict.*, *S. macrocarpa* Welw. ex Oliv., *sens. strict.* (=var. *typica* Loes.).

(b) Petals 6–7·5 mm. long : *S. macrocarpa* Welw. ex Oliv. vars. *latifolia* Loes. and *grandifolia* Loes., *S. euryoides* Hutch. et M. B. Moss.

The Idanre specimen cited above is the large-flowered form.

Salacia howesii Hutch. et M. B. Moss in Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 452–3 (1928) et in Kew Bull. **1929,** 22 (1929).

Ondo Province, Akure Division : Orosun Mountain near Idanre, alt. 760 m., 2 Jan. 1948, *R. W. J. Keay* 8682 (K, FHI, O, P, BM) :—low spreading shrub about 1·5 m. high ; older twigs purplish-black ; leaves thinly coriaceous, dark green above when mature, pale green beneath ; peduncles and pedicels green ; flowers ochraceous-yellow ; ovary and stigmas pale green ; in shallow soil on edge of bare rock-face near margin of high forest.

Distr. Gold Coast (*Howes* 974, Anaje, 7 miles N.W. of Sekondi), now recorded from Nigeria for the first time. A very rare species, apparently, hitherto only represented by the type-specimen. On p. 452 of the Fl. W. Trop. Afr. *S. howesii* is keyed out into the group of species with " inflorescence not repeatedly branched ". It should however come into the opposite group, as the inflorescences show at least four degrees of branching. Here it would key down to *S. lucida* Oliv., from which it may be easily separated by its puberulous inflorescences and leaf-shape.

Rubiaceae

Tricalysia sudanica A. Chev., Les Caféiers du Globe, **3,** 238 (1947).

Feretia coffeoides A. Chev. in Bull. Soc. Bot. France, **58,** Mem. **8d,** 179 (1912) ; Expl. Bot. Afr. Occ. Franç. **1,** 326 (1920).

Tricalysia coffeoides (A. Chev.) Hutch. et Dalz., Fl. W. Trop. Afr. **2,** 82–3 (1931), non Good in Journ. Bot. **64,** suppl. 2, 18 (1926).

Ondo Province. Akure Division : Deep valley between Orosun and Olurere peaks near Idanre, alt. about 410 m., 5 Jan. 1948, *J. P. M. Brenan and Dr. E. W. Jones* 8729 (K, FHI, O, P, BM) :—shrub about

6 m. high ; leaves stiffly papery, rather pale green, falling from the tree ; fruits globose, green going red and glossy, fleshy ; in dry marginal scrub on rock at foot of great bare granite massif.

Tricalysia coffeoides (A. Chev.) Hutch. et Dalz., the name used for our plant in Fl. W. Trop. Afr., is illegitimate, being a later homonym. *T. chevalieri* K. Krause in Engl. Bot. Jahrb. **43,** 141 (1909), based on *Chevalier* 7921 from the eastern Chari region, may be conspecific but differs somewhat in the smaller leaves with more impressed venation ; unfortunately I have seen no material of *T. coffeoides* (A. Chev.) Hutch. et Dalz. in a stage of development comparable with that shown by the type of *T. chevalieri*. More material is desired. Meantime, Chevalier has made a *nomen novum*, *T. sudanica*, for the illegitimate *T. coffeoides* (A. Chev.) Hutch. et Dalz., and this may be safely used for the present.

Psychotria talbotii Wernh. in Cat. Talbot Nig. 54 (1913) ; Hutch. et Dalz., Fl. W. Trop. Afr. **2,** 121, 124 (1931).

Ondo Province, Akure Division : Carter's Peak, Idanre, 18 Apr. 1943, *C. F. Symington in Forest Herbarium, Ibadan*, 3360 (0) :—large shrub ; flowers white ; in thickets on lower rocks. Lower slope of Carter's Peak, Idanre, alt. about 490 m., 1 Jan. 1948, *J. P. M. Brenan, Dr. E. W. Jones, R. W. J. Keay and Dr. P. W. Richards* 8641 (K, FHI, O, P, BM) ; shrub about 1·5–1·8 m. high, not much branched ; stems slender, grey-brown ; leaves subcoriaceous, mid-green and glossy above, pale green beneath, with linear bacterial nodules along midrib ; fruiting panicles drooping ; pedicels thickened, red ; fruits globose, fleshy, deep red. Same locality as 8641, alt. about 490 m., 1 Jan. 1948, *J. P. M. Brenan and R. W. J. Keay* 8651 (K, FHI, O, P, BM, CA) :—in shade of low forest. Idanre, alt. about 520 m., 2 Jan. 1948, *J. P. M. Brenan, Dr. E. W. Jones, R. W. J. Keay and Dr. P. W. Richards* 8679 (K) :—flowers small, white.

P. talbotii has been recorded previously only from Oban, Degema and the Rio del Rey, all E. of the Niger, Idanre being the first place to be known W. of the river.

The specimens cited above enable the description of *P. talbotii* to be amplified in several points. Wernham (*l.c.*) described the stipules as entire, but an isotype of *Talbot* 1054 at Kew shows the larger stipules to be clearly bicuspidate. The linear leaves of the original are exactly duplicated by 8641, but the other gatherings show that the lamina may often be considerably broader and elliptic-lanceolate. Wernham compared *P. talbotii* with *P. recurva* Hiern, but, while these two are certainly not distant relatives, it seems to me that *P. talbotii* has an obviously closer affinity with *P. calva* Hiern, from which it differs in its usually narrower more attenuate leaves and in the fewer (about 3–5) more ascending lateral nerves. Both *P. talbotii* and *P. calva* agree in possessing bacterial nodules and in their position, which is along the midrib. The nodules in the isotype of *P. talbotii* are difficult to see, but a careful examination discloses them towards the base of the midrib ; in the Idanre gatherings cited they are very conspicuous, showing (when dry) as blackish lines. *P. talbotii* must thus be added to Dr. Bremekamp's

list of the bacteriophilous species of *Psychotria* in Journ. Bot. **71,** 271–280 (1933).

The points in which Wernham's original description of *P. talbotii* may be altered or amended are as follows :—

Frutex usque ad 2 m. altus. Folia saepe coriacea, lineari-lanceolata usque elliptico-lanceolata et 4·8 cm. lata, subtus prope costam nodulis bacteriorum linearibus plus minusve nigrescentibus notatum. Stipulae usque ad 1 cm. longae, bicaudatae vel integrae. Fructis carnosus, globosus, 6–8 mm. diametro, ruber, pedicello incrassato rubro circiter 3 mm. longo suffultus.

Verbenaceae

Stachytarpheta. In endeavouring to name a gathering of this genus from Idanre I found the current classification so unsatisfactory that it was necessary to re-examine all the West African material.

The most recent treatment as far as our area is concerned is that of Hutchinson and Dalziel in Fl. W. Trop. Afr. **2,** 277 (1931), recognising, on leaf-shape alone, two species—*S. jamaicensis* Vahl with *S. indica* Vahl as a synonym, and *S. angustifolia* Vahl. Within the area of the Flora there are, however, three perfectly distinct species which should be easily identifiable by the following key :—

Calyx, when seen from the anticous side, showing four prominent teeth at apex, the two central ones equalling in length or rather shorter than the laterals. Leaves broad, ovate to elliptic or oblong-elliptic ; teeth on the well developed cauline leaves comparatively close and numerous, 11–18 on each margin, rarely as few as 10. Corolla with white centre :

Plant shrubby, with woody stems. Spikes almost always sparsely but distinctly pubescent. Corolla small, white or with pale blue tinge on the lobes, tube about 4–5 mm. long, scarcely exceeding the calyx, lobes about 1·5 mm. long
S. cayennensis (L. C. Rich.) Schau.

Plant herbaceous. Spikes glabrous. Corolla much larger, deep blue with white centre, tube about 10 mm. long, considerably exceeding the calyx, lobes about 3 mm. long
S. indica (L.) Vahl

Calyx, when seen from the anticous side, appearing bifid at apex, the two central teeth reduced to small inconspicuous denticles on the side of the much larger lateral teeth. Leaves narrow, oblanceolate to linear-oblanceolate ; teeth on the well developed cauline leaves coarse distant and few, 4–9 on each margin, rarely as many as 10. Corolla pale blue without a white centre. Plant herbaceous, rather fleshy . . . . . *S. angustifolia* (Mill.) Vahl

1. **Stachytarpheta cayennensis** (L. C. Rich.) Schau. in DC., Prod. **11,** 562 (1847) et in Mart., Fl. Bras. **9,** 199 (1851) (both as *Stachytarpha*) ;

Danser in Ann. Jard. Bot. Buitenz. **40,** 2 (1929) ; Moldenke in Pulle, Fl. Suriname, **4,** 274 (1940).

Verbena cayennensis L. C. Rich. in Act. Soc. Hist. Nat. Paris, **1,** 105 (1792).

Stachytarpheta cajanensis Vahl, Enum. Pl. **1**, 208 (1805).

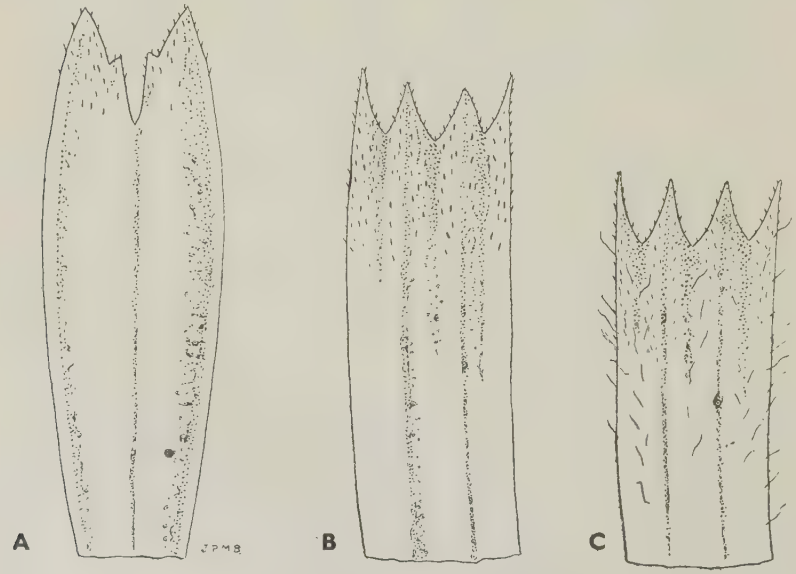
Stachytarpha cayanensis Link, Enum. Pl. Hort. Bot. Berol. **1,** 18 (1821).

[*Stachytarpheta indica* (non (L.) Vahl) Baker in Thiselton-Dyer, Fl. Trop. Afr. **5,** 284 (1900), p.p. quoad *Scott Elliot* 4162].

[*Stachytarpheta jamaicensis* (non (L.) Vahl) Hutch. et Dalz., Fl. W. Trop. Afr. **2,** 277 (1931), p.p. quoad spec. cit. *Scott Elliot* 4162, *Dawodu* 364, *Dennett* 502].

Sierra Leone. Sierra Leone, 1891, *G. F. Scott Elliot* 4162 (K) :—shrub 2 m., with white flowers, common in waste places. Freetown, 4 June 1933, *F. C. Deighton* 2716 (K) :—common weed 1 m. high or up to 1·2 m. or even more when straggling by hedges ; much branched, branches and spikes diverging and not becoming erect as in 2715 [*S. angustifolia*] and 2545 [*S. indica*] ; smaller leaves than 2545 from which plant is is always readily distinguishable even at a distance ; distribution of 2545 and 2716 is different. Kenema, 23 Apr. 1946, *F. C. Deighton* 4291 (K) :—common weed round towns ; a woody undershrub up to 1 m. high ; flowers rather pale blue shading to white in the centre.

Nigeria. Lagos, *J. Dawodu* 364 (K). Lagos, 2 June 1909, *R. E. Dennett* 502 (K) :—a shrub about 1 m. high. Lagos 23 Jan. 1919, *Dr. J. M. Dalziel* 1393 (K) :—a weed of waste ground : vernacular name (Yoruba) " àgógó ìgún ". Lagos, 19 Dec. 1927, *O. Hagerup* 803 (K) :—



Calyces of *Stachytarpheta* spp. seen from the anticous side, all × 10 ; the small fifth posticous calyx-tooth is on the further side of the compressed calyces, and is not visible.

A. *Stachytarpheta angustifolia* (Mill.) Vahl.
B. *Stachytarpheta indica* (L.) Vahl.
C. *Stachytarpheta cayennensis* (L. C. Rich.) Schau.

1 m. high ; flowers pale blue. Oyo Province, Ibadan Division : Ibadan, Dec. 1935, *R. J. Newberry* 134 (K) :—shrub with light blue flowers : vernacular name (Yoruba) " agogo-ogun ". Ondo Province, Akure Division : Weed by path between the rest-house and the village, Idanre, alt. c. 450 m., 4 Jan. 1948, *J. P. M. Brenan* 8709 (K, FHI, BM, P, CA) :—slender-stemmed shrub to c. 1·5 m. high, much branched above ; young stems green, older pale grey ; leaves mid-green above, with very impressed nerves and veins, almost bullate ; corolla small, white, with pale blue tinge on the lobes. Calabar Province, Eket Division : Eket District, 1912–13, *Mr. and Mrs. P. A. Talbot s.n.* (K).

S. cayennensis is native to the tropics of the New World, where it has a wide distribution ; it has also been introduced to parts of the Old World but has not hitherto been recorded from Africa.

I am indebted to the kindness of the Director of the Conservatoire et Jardin Botanique at Geneva who courteously sent on loan the type-specimen of *Verbena cayennensis* L. C. Rich., collected by Le Blond from French Guiana. This specimen closely resembles what has been interpreted as *S. cayennensis* in S. America, except that the inflorescence-axes and calyces lack the longer crisped hairs normally seen in *S. cayennensis*. Although I have not found a precise match, as far as the indumentum is concerned, for Le Blond's specimen among the S. American material of *S. cayennensis* at Kew, I certainly do not consider the slight difference to be specific, and therefore maintain *S. cayennensis* in its customary sense.

Richard's original spelling of the epithet was " *cayennensis* " and this must be retained. My colleague Mr. E. Milne-Redhead has kindly pointed out that Vahl, to whom the combination under *Stachytarpheta* is usually attributed, spelt the epithet " *cajanensis* "—a version so different from the original as in effect to constitute a new name, and a quite unjustified one. Link's later " compromise "—" *cayanensis* "—does not affect the problem. The binomial *Stachytarpheta cayennensis* is therefore here attributed to Schauer, who was the first to transfer Richard's epithet to *Stachytarpheta*.

The original spelling of the genus was *Stachytarpheta*. Link's emendation of this to *Stachytarpha*, though perhaps a philological improvement, cannot be upheld under the Rules. Although Schauer used *Stachytarpha*, this is clearly only an orthographic variant of the original which can be corrected without alteration of the authority.

2. **Stachytarpheta indica** (L.) Vahl, Enum. Pl. **1,** 206 (1805) ; Baker in Thiselton-Dyer, Fl. Trop. Afr. **5,** 284 (1900), p. max. parte, excl. *Scott Elliot* 4162 ; Danser in Ann. Jard. Bot. Buitenz. **40,** 5 (1929).

[*Stachytarpheta jamaicensis* (non (L.) Vahl) Hutch. et Dalz., Fl. W. Trop. Afr. **2,** 277 (1931), p.p. quoad *Vogel* 30, *Mann* 89, *Scott Elliot* 3833, *Johnston s.n.*]

Sierra Leone. Very common all round Sierra Leone, 1891–2, *G. F. Scott Elliot* 3833 (K). Makumri, alt. 110 m., 15 June 1914, *N. W. Thomas* 532 (K) :—vernacular name (T.) " egbedi ". Mabum, alt. 110 m., 19 Aug. 1941, *N. W. Thomas* 1566 (K) :—on a sandy beach, a variety with somewhat fleshy leaves ; this form with large deep blue

flowers and dark green leaves is common inland. Weed at Njala, 27 Oct. 1932, *F. C. Deighton* 2545 (K) :—bushy, 0·6–1 m. high, with deep blue flowers. Rokupr, 19 Feb. 1946, *F. C. Deighton* 4173 (K) :—on upland above a tidal marsh ; leaves deep green ; flowers deep blue with a white centre.

Liberia. Liberia, without precise locality, 1906, *Sir. H. Johnston s.n.* (K). Monrovia, 19 Nov. 1926, *D. H. Linder* 1567 (K) :—a weed in streets with blue flowers.

Gold Coast. Cape Coast Castle, *Vogel* 30 (K). Axim, 30 Dec. 1911, *T. F. Chipp* 48 (K) :—a blue flowered herb. Ankobra Junction, 20 Feb. 1928, *Sir. E. A. Kitson s.n.* (K).

Nigeria. Calabar Province, Calabar Division : Old Calabar, 22 Jan. 1897, *J. H. Holland* 15 (K) :—flowers small, blue. Oban, 1911, *P. A. Talbot* 307 (K). Oban, 1911–2, *Mr. and Mrs. P. A. Talbot s.n.* (K).

Fernando Po. December 1859, *G. Mann* 89 (K) :—herbaceous plant 1 m. high ; flowers blue.

Hutchinson and Dalziel make *S. indica* (L.) Vahl a synonym of *S. jamaicensis* (L.) Vahl, in my opinion wrongly. For the distinctions between them, reference should be made to the descriptions and plates by Danser in his account of the genus in Ann. Jard. Bot. Buitenz. **40,** 1929. According to Danser's definition, the true *S. jamaicensis* does not occur in West Africa at all, though both it and *S. indica* are in East Africa.

3. **Stachytarpheta angustifolia** (Mill.) Vahl, Enum. P. **1,** 205 (1805) ; Baker in Thiselton-Dyer, Fl. Trop. Afr. **5,** 284 (1900) ; Hutch. et Dalz., Fl. W. Trop. Afr. **2,** 277 (1931).
Verbena angustifolia Mill., Gard. Dict., ed. 8, no. 15 (1768).

The distribution of this species and the specimens cited in the Fl. W. Trop. Afr. are accurate, so that a repetition here is unnecessary. One of the specimens cited there under *S. jamaicensis—Dawodu* 224, from Lagos—is *S. angustifolia.*

The type-specimen of *Verbena angustifolia* Mill., sent by Houston from La Vera Cruz, is in the British Museum Herbariu, where I have examined it. It is obviously conspecific with our African plant, and I can match it very satisfactorily with gatherings from Sierra Leone. It seems likely that *S. angustifolia*, alone of the three species dealt with here, is native in Africa.

Danser, in the paper in Ann. Jard. Bot. Buitenz. **40** (1929) already referred to, records hybrids of *S. cayennensis* and *S. indica*, as well as others involving *S. jamaicensis*. Hybrids in this genus have not been recorded in Africa, but botanists will do well to look out for them.

In conclusion special acknowledgment should be made to Mr. F. C. Deighton, Agricultural Department, Sierra Leone, who has realised for some years that three different Stachytarphetas occurred in Sierra Leone, and sent to Kew excellent material, dried and in spirit, to back up his opinion.

MORE NEW PLANTS FROM THE IDANRE HILLS, NIGERIA.

J. P. M. Brenan.

While naming the collections made by the Cambridge Expedition at Idanre, I took the opportunity of naming some others from the same area, mainly made by Messrs. R. W. J. Keay and C. F. A. Onochie, among which are the following novelties.

My colleague Mr. R. D. Meikle has kindly contributed an account of a new *Eriocaulon*.

Melastomataceae

Dissotis rotundifolia (*Sm.*) *Triana* var. **fruticosa** *Brenan*, var. nov. ; ab aliis formis *D. rotundifoliae* sens. lat. habitu fruticoso erecto usque ad 1·5 m. alto crebre ramoso distat. Praeterea foliorum forma et indumento ei formae cui nomen olim *D. prostrata* (Thonn.) Triana valde propinqua sed foliis supra densius strigosis.

Ondo Province, Akure Division : Idanre Hill, below Carter's Peak and S. of the rest-house, 20 Oct. 1946, *R. W. J. Keay and C. Onochie in Forest Herbarium, Ibadan*, 20246 (Herb. Ibadan) :—small erect shrub growing with *Trilepis* (*Catagyna*) ; young stems red ; fruit pale green with red spots. Carter's Peak, 24 Oct. 1948, *R. W. J. Keay in Forest Herbarium, Ibadan*, 22583 (Herb. Kew.) :—in *Trilepis* mats on lower slope of granite hill just above the forest ; much branched, shrubby perennial ; young stems pink, older ones grey-brown ; leaves white beneath ; flowers pale pink, open in morning. Ondo Division : About 3 miles E. of Ondo, N. of the Akure road, 21 Sept. 1948, *R. W. J. Keay in Forest Herbarium, Ibadan*, 22569 (typus varietatis in Herb. Kew., Herb. Ibadan) :—on rocky slope with *Coleus* (22561) and *Cyanotis lanata* at margin of forest tongue ; erect much branched shrub about 1·5 m. high ; stems, petioles and the nerves of the leaves dark pink ; lamina glaucous beneath, dark green above ; calyx pale green ; petals pale pink, about 2–3 cm. long.

Dissotis rotundifolia (Sm.) Triana, as at present interpreted, is a disturbingly variable species especially in habit, including erect shrubs such as the present variety and prostrate herbs rooting at the nodes. There is probably a good deal to be said for returning to the older idea and separating *D. prostrata* (Thonn.) Triana, at least varietally. *D. prostrata*, as far as West African material is concerned, is separable from *D. rotundifolia* by the leaf-shape and absence of spreading hairs on the petiole, but even these characters, admittedly not very profound ones, seem to collapse in East Africa.

At present it seems worth while to separate the above Nigerian specimens as a new variety, since they are distinguishable from other forms of *D. rotundifolia* and hang well together among themselves in habit, leaf-shape and indumentum. The new variety seems to be confined to rocky hills. Seeds of this were brought back to Kew from Idanre and living flowering plants were thus available when the description was drawn up.

RUBIACEAE

Neobaumannia hedyotoidea (*K. Schum.*) *Hutch. et Dalz.* var. **longipila** *Brenan*, var. nov. ; a planta typica caulibus foliisque pilis longioribus flexuosis patentibus nec appressis differt.

Ondo Province, Akure Division : Akure Forest Reserve, on the "Big Stone", 28 Oct. 1948, *R. W. J. Keay in Forest Herbarium, Ibadan*, 22664 (Herb. Kew.) :—in *Trilepis* and *Loudetia* mats ; erect shrub to 1·2 m. high with fleshy stems and open branching ; bracts white ; corolla blue. On rocks near summit of Carter's Peak, Idanre, 18 Apr. 1943, *C. F. Symington in Forest Herbarium, Ibadan*, 3377 (Herb. Ibadan & Imp. For. Inst., Oxon.): —dwarf shrub ; stems semi-succulent ; flowers not seen. Carter's Peak, Idanre, on deeper soil among *Trilepis* mat on smooth granite slope, 20 Oct. 1946, *R. W. J. Keay & C. F. Onochie in Forest Herbarium, Ibadan*, 21561 (Herb. Ibadan) :—fleshy, almost herbaceous shrub 1·2 m. high ; stems dull purple ; flowers white, tinged pale blue. Carter's Peak, Idanre, in *Trilepis—Hymenodictyon* clumps, 24 Oct. 1948, *R. W. J. Keay in Forest Herbarium, Ibadan*, 22586 (typus varietatis in Herb. Kew.) :—erect shrub to 1·5 m. high with fleshy stem ; bracts white ; corolla blue.

Typical *N. hedyotoidea* has its indumentum all short and appressed, while the new variety has the leaves and stems more or less plentifully clad with longer flexuous hairs which are spreading. On the stems of the new variety short appressed hairs occur plentifully in addition to the longer spreading ones.

The var. *longipila* is apparently restricted to rocky granitic peaks in Ondo Province in Southern Nigeria, to the exclusion here of the typical plant which is only known from the Bauchi Plateau well away to the north, and from the Gold Coast and Togo. The new variety certainly seems well-marked and geographically separated, though I can find nothing beyond the indumentum to separate it from the typical plant.

Neobaumannia has dimorphic flowers, each plant apparently producing flowers of only one kind. Of the flowering specimens of var. *longipila*, 21561 and 22586 have exserted styles and included stamens, and 22664 has exserted stamens and included styles. Of three different gatherings of the typical plant from the Bauchi Plateau, all have exserted stamens.

CONVOLVULACEAE

Ipomoea (§ Leiocalyx) **stenobasis** *Brenan*, sp. nov. ; ut videtur *I. repenti* Lam. inter species africanas proxima, caulibus petiolisque gracilioribus, foliis apice saepe angustatis subtus conspicue glanduloso-punctatis, corollis minoribus, tubo basi insigniter angusto superne abruptius ampliato facile distinguenda.

Herba late repens, caulibus prostratis leviter angulatis 2–3 mm. diametro pilis numerosis albidis brevibus e caule apud nodos unilateraliter exorientibus exceptis glabris vel nonnunquam omnino glabris internodiis 4–15 cm. longis. *Folia* tenuiter papyracea, late cordata, circiter 4–9 cm.

longa et lata, integra, apicem obtusum et breviter mucronatum versus breviter angustata vel nonnunquam acuminata, basi sinu aperto 1·5–5 cm. lato circiter 0·7–1 cm. alto, supra pilis minimis brevissimis praesertim in nervis dispersis nonnisi sub lente cernendis inconspicue puberula, subtus glabra ; costa et nervi laterales utroque costae 6–7 (nervis basalibus utrinque 3–4 inclusis) supra prominuli, subtus satis prominentes et conspicui, rete venularum supra aegre cernendo subtus conspicuo ; lamina subtus sub lente visa glandulis minutis numerosissimis subnigris dense punctata ; petiolus elongatus tenuis, 5–10·5 cm. longus, in statu sicco usque ad 1 mm. diametro, glaber, supra anguste canaliculatus. *Inflorescentiae* axillares, 3–5-florae vel nonnunquam depauperatae uniflorae, pedunculis glabris satis validis 2–7 cm. longis suffultae ; pedicelli 1·3–3·2 cm. longi ; bracteolae minimae, circiter 2–5 mm. longae, caducissimae. *Calyx* ambitu ellipsoideus, glaber, circiter 9–12 mm. longus, 5–6 mm. latus ; sepala 2 exteriora crassa, pallida, elliptica, convexa, 9–11 mm. longa, explicata circiter 7 mm. lata ; sepala 3 interiora paullum majora ; omnia apice rotundata. *Corolla* infundibuliformis, 3·5–5 cm. longa, pallide roseo-purpurea ; tubus circiter 2·5–3·5 cm. longus, extra glaber, parte basali circiter 5–10 mm. longa insigniter angusta circiter 2–2·5 mm. diametro ; limbus patens, circiter 3 cm. diametro. *Staminum* filamenta 5–9 mm. longa, parte libera glabra sed ubi ea cum tubo corolla conjuncta est pubescentia ; antherae oblongae, 2 mm. longae. *Ovarium* glabrum, circiter 1 mm. altum, in stylum filiformem 2·5 cm. longum angustatum ; stigma parvum, capitatum, pilis plumosis radiatum. *Capsula* (e spec. *Chandler* 983, *Maitland* 206 descriptum) subglobosa, circiter 1·5 cm. diametro, brunneo-straminea, longitudinaliter venosa, apice in apiculum circiter 5 mm. longum abrupte angustata. *Semina* brunnea, ellipsoidea vel plus minusve trigona, 7–8 mm longa, 5–6 mm. lata, praesertim prope hilum plus minusve pilosa.

Nigeria. Ondo Province, Akure Division : Idanre Hills, on rocks by Idanre Rest-house, 31 Oct. 1948, *R. W. J. Keay in Forest Herbarium, Ibadan*, 22674 (Herb. Kew.) :—herbaceous creeper, spreading out from the bush on to bare rock slabs ; flowers magenta-pink.

Uganda. Eastern Province, Teso District : Serere, near damp but not swampy areas, alt. 1100 m., Dec. 1931, *P. Chandler* 268 (Herb. Kew.) : —flowers pale mauve tinted. Agu Swamp, close to banks of swamp, alt. 1070–1080 m., Sept. 1932. *P. Chandler* 983 (Herb. Kew.) :—height several feet ; flowers pale magenta. Buganda Province, Mengo District : Entebbe, alt. 1186 m., Nov. 1922, *T. D. Maitland* 577 (typus in Herb. Kew.) :—a robust spreading plant, but does not climb readily ; vernacular name " kimonde monde ", because of its resemblance to the sweet potato " lumonde " (*Ipomoea batatas*). Province and district ? Victoria Nyanza region, *T. D. Maitland* 206 (Herb. Kew.).

This species has sometimes been misidentified with *I. repens* Lam., and the two certainly have a good deal in common. *I repens*, at any rate on the herbarium sheet, has a rather coarse and succulent look about it, while *I. stenobasis* is more slender and graceful. The most satisfactory difference is in the shape of the corolla : the tube of *I. repens* broadens immediately above the base and by the time it has got above the sepals it is

(from pressed specimens) 7–10 mm. wide ; in *I. stenobasis* the tube does not broaden at all at the base, but remains only about 2–2·5 mm. in diameter for about 5–10 mm. above the base, and this narrow part sticks out beyond the calyx ; and then above this the tube gradually enlarges. Another useful point is the much more conspicuous glandular dotting on the lower side of the leaves ; faint dots are certainly visible at times in *I. repens*, but not approaching in clarity those of *I. stenobasis*. The more pointed apex of the leaves of the latter will serve as further confirmation.

The distribution of *I. stenobasis* is not as odd as it seems, since the extension as far east as Uganda of a flora with marked similarities with that of West Africa is now a well-known fact. I think is a safe bet to prophesy that *I. stenobasis* will turn up in the lands between Uganda and Nigeria.

A collection of seeds which *may* (there is doubt about it) come from the Nigerian plant shows decided differences from Uganda seeds. If these differences prove to be genuinely within *I. stenobasis*, then it may be necessary to separate the Nigerian plant as a var., but not in my opinion more, as the Nigerian and Uganda plants are vegetatively and florally the same. The description of the seeds is drawn up entirely from the Uganda specimens.

Labiatae

Solenostemon monostachyus (*P. Beauv.*) *Briq.* var. **marrubiifolius** *Brenan*, var. nov. ; a planta typica foliorum pagina superiore breviter sed dense subtomentosa necnon arcte areolato-bullata, inferiore praesertim in nervis albido-tomentosa valde distincta.

Herba erecta, usque ad 45 cm. alta vel nonnunquam fere prostrata. *Folia* rotundato-ovata, circiter 2–4·5 cm. longa et lata, apice obtusa, basi in petiolum abrupte decurrentia. *Inflorescentiae* elongatae usque ad 37 cm. longae, verticillastris inferioribus fructiferis circiter 1–2·5 cm. inter sese distantibus. *Corollae* 1·4 cm. longae, saturate rubro-purpureae.

Ondo Province, Akure Division : Growing among *Trilepis* below Carter's Peak and south of the rest-house, Idanre, 20 Oct. 1946, *R. W. J. Keay and C. F. Onochie in Forest Herbarium, Ibadan*, 20244 (Herb. Ibadan) :—erect herb up to 45 cm. high ; stems pale below and purple at apex where they form the inflorescence-axes ; corolla and stamens deep lilac. Carter's Peak, Idanre, among and at the edge of *Trilepis* mats, 24 Oct. 1948, *R. W. J. Keay in Forest Herbarium, Ibadan* 22585 (typus varietatis in Herb. Kew.) :—erect herb, sometimes almost prostrate when extending from *Trilepis* mat out onto bare rock ; flowers deep mauve.

This is an extremely distinct variety, and it is only after some havering that I have described it as a var. rather than a new species. The very striking bullate appearance of the upper surface of the leaf with the rather coarse indumentum split up by channels into little areoles, together with the coarser whitish tomentum on the lower side, is most distinctive ; but that seems to be all, except for slightly coarser pubescence on the inflorescence. The plant described by Chevalier in Journ. de Bot. **22,**

121 (1909) as *S. graniticolus* provides a connecting link between var. *marrubiifolius* and the normal run of *S. monostachyus*, having the leaves ± bullate above but with finer indumentum making the areolation less distinct, and with an acute apex to the leaf. *S. graniticolus* was sunk as a mere synonym under *S. ocymoides* by Hutchinson and Dalziel, Fl. W. Trop. Afr. **2,** 290 (1931), and I agree thst *S. graniticolus* should not stand as a distinct species on the present evidence. But it is a reasonably good variety, and I propose the following new combination : *Solenostemon monostachyus*, (P. Beauv.) Briq. var. **graniticolus** (*A. Chev.*) *Brenan*, comb. et stat. nov.

But even after this var. has been carved out of *S. monostachyus* a far from homogenous residue is left behind. There is still a disturbing amount of variation in such things as leaf-shape, density of inflorescence, and especially size of corolla. I think that it is quite on the cards that the correct eventual way of dealing with *S. monostachyus* will be to recognise a number of microspecies under it. In the meantime more observation in the field is what is wanted.

Eriocaulaceae

Eriocaulon nigericum *Meikle*, sp. nov. *E. hanningtonii* N.E. Br. affine, sed foliis latioribus subobtusis, capitulis obscure pubescentibus, bracteis involucralibus fuscis nec stramineis differt.

Herba annua, rosulata, caulis prebrevis. *Folia* late linearia vel ligulata, 15–30 mm. longa et 2–6 mm. lata, 16–20-nervia, apice obtusa vel abrupte acuta, glabra, subspongiosa, obscure fenestrata, in sicco olivacea ; vaginae foliis breviores, usque 20 mm. longae, parte superiore laxae, glabrae, apice membranaceae, scariosae, in lobos 2 vel 3 irregulariter fissae. *Pedunculi* 5–20, folia longe superantes, circiter 20–100 mm. longi, glabri, 6-costati, costis leviter tortis. *Capitula* depresso-globosa, circiter 3–4 mm. diametro, brunneo-fusca, sub lente distincte pubescentia ; bracteae involucrales late obovatae, circiter 2 mm. longae et 1·3 mm. latae, concavae, glabrae, apice obtusae, parte inferiore stramineae, parte superiore griseo-fuscae ; bracteae flores stipantes anguste obovatae, circiter 1·5 mm. longae et 1·0 mm. latae, apice obtusae vel subacutae, concavae, parte superiore fuscae, summitate pilis albis perpaucis ornatae. *Receptaculum* longe pilosum. *Flos* ♂ breviter pedicellatus ; sepala 3, circiter 1 mm. longa, usque ad medium in tubum connata, apice acuta, parce pilosa, parte superiore fusca subglabra ; corollae tubus angustus, usque 0·5 mm. longus, pallidus, apice in lobos 3 minutos eglandulosos divisus ; antherae 6 subglobosae, circiter 0·25 mm. diametro, nigrae. *Flos* ♀ distincte pedicellatus ; sepala 3 libera, subaequalia, circiter 1·5 mm. longa et 0.8 mm. lata, carinata, dorso paullo gibbosa, fusca, albo-pilosa, apice acuta, recurvata ; petala 3 subaequalia, lanceolata, usque 1·8 mm. longa et 0·6 mm. lata, eglandulosa, parte superiore fusca, summitate pilis albis perpaucis ornata ; ovarium circiter 0·5 mm. diametro, pallide brunneum ; stylus circiter 0·2 mm. longus, supra in stigmata 3 filiformia usque 1 mm. longa divisus. *Semina* ovoidea, usque 0·3 mm. longa et 0·2 mm. lata, fulva, papillosa.

Nigeria. Ondo Province, Akure Division : Idanre, about 490 m. alt. above the old village, 25 Aug. 1946, *A. P. D. Jones in Forest Herbarium, Ibadan* 20718 (typus in Herb. Kew.) :—In a close grassy sward in a damp flush at the head of a ravine. With terrestrial *Utricularia*, *Drosera indica* and small sedges in a closely felted peat.

A NEW BRACHIARIA FROM BURMA

N. L. Bor

Brachiaria burmanica *Bor*, spec. nov., *B. subquadriparae* (Trin.) Hitch. similis sed ab ea spiculis multo majoribus, lanceolato-ellipticis haud elliptico-oblanceolatis, pilis brevibus aureis tectis recedit.

Gramen annuum. *Culmi* usque 40 cm. alti, laeves, glabri sed infra paniculam dense puberuli, teretes, vaginis tecti, striati, nodis hirsutissimis. *Foliorum laminae* elliptico-acuminatae vel lanceolato-elliptico-acutae, planae, 3–5 cm. longae, circiter 1 cm. latae, in apicem validum attenuatae, utrimque pilis albis basi papillosis obsitae, multi-nerves, marginibus cartilagineis scabrae, basi rotundatae ; *vaginae* culmum complectentes, striatissimae, pilis basi papillosis hirsutae ; *ligulae* angustissimae, membranaceae.

Racemi 3–5, patentes ; rhachis applanata, glabra ; *spiculae* imbricatae, pedicellis 1 mm. longis pilis albis nonnullis instructis fultae, 3·5 mm. longae, 1·5–1·75 mm. latae, lanceolato-elliptico-acutae ; *gluma inferior* 2 mm. longa, 2·5 mm. lata, late ovata, acuta, 7-nervis, apicem versus minute puberula ; *gluma superior* 3·5 mm. longa, lanceolato-elliptico-acuta, 7-nervis, dorso omnino pilis brevibus albis vel aureis e tuberculis ortis tecta. *Anthoecium inferius* vacuum ; *lemma* 3·5 mm. longum, anguste elliptico-acutum, 5-nerves, dorso omnino pilis brevibus aureis tectum ; palea abest. *Anthoecium superius* ♂ ; *lemma* 3 mm. longum, late ovato-ellipticum, obtusum, dorso transverse rugosulum, chartaceum, 3-nerve ; *palea* similis ; *stamina* 3 ; *antherae* 1·5 mm. longae.

Burma : Rangoon, beside Godwin Road, 20 Jun. 1948, *U. Thein Lwin* 526 (Typus in Herb. Kew.) Tatgyigon Grazing Ground, 28 Jun. 1947, *ibid.* 109 ; Prome Distr., beside P.W.D. Road, 21 Jul. 1948, *ibid.* 587.

NOTES ON THE GENUS BERSAMA IN AFRICA

B. Verdcourt

Few genera are in such a state of confusion as the genus *Bersama* Fres.[1]. Three species are dealt with in the Flora of Tropical Africa (1868), whilst at the present time the number of published names is nearly 60. This twentyfold increase is due mainly to the efforts of E. G. Baker[2], Gürke, Gilg[3] and von Brehmer[3]. The latter two authors arew ell known to have had extremely narrow views on the limits of species and a complete inability to understand that some species are remarkably polymorphic, though their descriptions were usually full and accurate. E. G. Baker also had similar views on species, and his descriptions were not always adequate. All the authors have frequently described new species from quite inadequate material and very often from single specimens only. Engler[4] published a brief synoptic key to the species of the genus but he used quite unworkable characters : some which vary on one individual, e.g. nature of leaflet margins ; others which are quite imaginary, e.g. the shape of the stigma in those species which have a globose stigma. His key is not even complete, for it omits one of the three species described in the Flora of Tropical Africa. Phillips[5] has dealt with the South African species.

The confusion in the genus is not however solely the result of indifferent work, it is also due to something intrinsic in the genus. It is one of those genera which is very probably not capable of treatment by classical taxonomic methods. Many people have attempted this and found it impossible. The various characters although frequently very constant for a given individual show no correlation. Scarcely two individuals are alike. The wider the geographical area considered, the more marked does this lack of correlation become. It is little wonder that botanists with narrow specific concepts described so many species. The explanation for this state of affairs is not easy to discover by work in the herbarium. The genus may be apomictic ; it is certainly one which invites cytological investigation. It seems likely that the main centre of the genus was originally in South Africa, where the species are more distinct, from whence a very rapid spread north took place. Coupled with the fact that the population of individuals was sufficiently scattered, intense local apparent speciation is occurring. The species are still in the making. The result is that it is impossible to name *Bersama* specimens at the present time. Most of the names on herbarium sheets are guesses, usually put down in sheer desperation after trying to match the specimens and failing. The majority of sheets are however just labelled " *Bersama* sp." It is obvious that if this state of affairs is to come to an end a drastic step must be taken. The author has come to the firm conclusion that a large number of the proposed species should be treated as a single aggregate species which is genetically very variable—*B. abyssinica* Fres. Until some such proposal is accepted by botanists it will not be possible to provide reliable names for any material of *Bersama*. The alternative proposal of naming every form which comes to hand, although appealing to some botanists, is a futility unworthy of science.

The writer has taken the step in this present paper which is but a very preliminary treatment. No attempt is made to name the varieties or

monograph the genus. A description of the kind of variation which is taking place is given on a geographical basis but the writer does not intend to provide varietal names until the genus has been more thoroughly studied in the field and much fuller information is available concerning behaviour in different habitats, appearance of the different stages of growth, amount of variation within a population, and chromosome numbers. This course may be considered unsatisfactory by many but in the writer's opinion it is better than the chaos which has prevailed during the past 30 years. It seems better to wait for a few years than to propose a new scheme of classification which further field work is bound to modify.

The study of the genus is complicated by the fact that very many of Gilg and von Brehmer's types (and also some of Gürke's) at Berlin were destroyed during the war. It was feared that Rüppel's specimen of *B. abyssinica* Fres. (the type) had also been destroyed at Frankfurt, but the collections at the Senckenberg Museum were not so badly damaged as was at first believed. The writer has been able to examine this type through the kindness of Prof. Dr. R. Kräusel, Keeper of the Botanical Department of that institution. It is a good specimen and shows clearly that *B. abyssinica* is a form with an annular or almost entire disc, and non-alate leaf-rachis. *Schimper* 1507, a sheet which has been widely distributed, is clearly conspecific and may be taken as an authentic specimen.

It is perhaps worth pointing out here that the family diagnosis of Melianthaceae given by Hutchinson[5] is inaccurate in certain details. Hutchinson states that the disc is unilateral and gives the number of stamens as 4. In reality the disc is frequently annular and the number of stamens varies from 4–6.

The writer's conclusions have been reached after study and dissection of all the material in the herbaria of the following institutions. East African Agricultural and Forestry Research Organisation, Amani, Tanganyika ; Forestry Department, Entebbe, Uganda ; and Royal Botanic Gardens, Kew. The following characters have been particularly noted.

1. Leaves
   (a) size and shape of leaflets, (b) winging of rachis, (c) number of leaflets, (d) margin of leaflets, (e) indumentum, (f) length of petiolules.
2. Length and indumentum of inflorescence.
3. Size of flowers and length of pedicels and bracteoles.
4. Sexuality of the flowers.
5. Shape and indumentum of the calyx.
6. Stamens :—number and degree of connation.
7. Shape of the disc.

It was found that the majority of these characters were, so far as could be made out from herbarium material, constant for a given individual, but field work is necessary and it would be most helpful if future collectors would pay attention to the characters mentioned above. Practically no field notes on these characters are available save for the specimens

collected by Welwitsch. The size of the leaf varies within wide limits on one plant. The leaflets may be serrate, deeply toothed or entire on the same plant. The winging of the leaf rachis is more constant but this also shows variation in the individual. The number of stamens also is inconstant in a given individual. In some areas it is very constant, e.g. nearly always 4 in the west, but in others the number varies from 4–6 on the same plant. The degree of connation also varies and the distinction between the sections *Eubersama* and *Natalia* cannot be upheld (Baker[2] agreed that *Natalia* could not be considered as separate genus). There are undoubtedly hermaphrodite forms and functionally female forms. Many of the sheets of gatherings collected in young fruit have these young fruits surrounded by a ring of small stamens. These stamens bear aborted anthers which contain no pollen and do not dehisce. The marked difference in the indumentum of the sexual parts may bear some relation to these forms and cannot be used as characters. Much of the herbarium material is not in the right state to decide upon the sexuality of the flowers. It is for instance difficult to decide if functionally male flowers exist since one has no way of knowing whether the young ovules present will develop or not. The remainder of the characters appear to be constant for a given individual but vary very much from one individual or population to another. These will be noted chiefly in the section discussing the detailed variation of the species, but a few general observations follow.

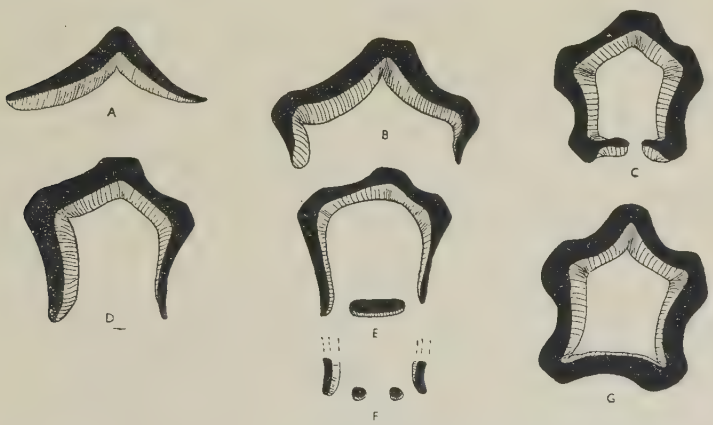


Fig 1. Discs of *Bersama*.

The sepals may be obtuse or rather acute, glabrescent or thickly covered with golden-brown or reddish hairs. The degree of fusion of the two anterior sepals is most variable and is in any case an unsatisfactory character since mechanical splitting easily occurs in dried or drying material. The " strength " of the fusion between the two sepals is often quite low and though they appear quite fused, a slight pull will part them. Great use has previously been made of the presence of 4 or 5 sepals. The inflorescence varies in length and robustness, from 10–40 cm. Flowers vary in size and this again may be linked (as it often is in other genera) with the functional sexuality of the flower. The length of the pedicels and

bracteoles varies from 0–1 cm. or in the case of pedicels even more. Some forms (particularly *le Testu* 2055) have lower pedicels about 2·5 cm. long and certainly appear totally distinct from those having sessile flowers. The length of the pedicels varies with the age of the flower and they may be accrescent in some cases. The disc has been used as a character by Engler and it is certainly a character which varies considerably from form to form and appears to be constant for a given form. The writer has used it as a character but he may be entirely mistaken in considering it to be of any importance. Since the range of variation is difficult to describe and has often been described by means of peculiar terms by other authors, a few diagrams are given here (Fig. 1). There is only a slight amount of variation to be found in the disc from adult flowers of the same plant—e.g. forms shown in Fig. 1*e* and 1*f* or 1*c* and 1*g* may be found on the same plant. Only very rarely is a completely intermediate, ± 3 lobed disc found (Fig. 1*b*), thus showing that even the disc is not a thoroughly reliable character but is more so than most.

The author proposes that the following species should be sunk into the aggregate *Bersama abyssinica* Fres. Where the type has almost certainly been destroyed and no material has been seen a question mark is appended to the name. The descriptions make it clear that the forms concerned come within the conception of the aggregate. The author is as averse to sinking names from descriptions alone as are most botanists. If a few of these names prove to be worthy of recognition they can always be reinstated, but the author has felt that with the present genus a " clean sweep " was the only way out. Some of the names have been cited under varieties but the precise limits of these are uncertain and no new combinations have been made. An indication only has been given of their application. Further field work will define the limits and probably indicate that other names must be reinstated as varieties. No attempt has been made to key out the forms since it is impossible and the result would be entirely without value.

A preliminary classification into two subspecies is here proposed based on disc characters. Some of the forms which are being sunk into the aggregate species cannot be correctly assigned to their subspecies since the material is inadequate or types have not been seen or are not available or descriptions are not adequate. Certain names in each subspecies have been cited as varieties and it is certain that further forms at present placed under the subspecific name will have to be identified with one of these varieties or raised as new varieties. The names immediately following the subspecific names are not therefore all of equal varietal standing. This must be emphasized.

Bersama abyssinica Fres. in Mus. Senckenb. **2,** 281 (1837).

B. coriacea Bak. f. in Journ. Bot. **45,** 15 (1907—material inadequate).

? *B. giuliarelli* Chiov. in Atti R. Acad. Ital. **11,** 26 (1940).

? *B. maschonensis* Gürke in Engl. Bot. Jahrb. **40,** 88 (1907) (possibly = *B. nyassae* Bak. f.).

A subspecies **abyssinica** s. str.

B. chloroleuca Brehm. in Engl. Bot. Jahrb. **54,** 414 (1917). *B. erythrocarpa* Brehm. loc. cit. 395. ? *B. gallensis* Brehm. loc. cit. 403. ? *B. goetzei* Gürke in Engl. Bot. Jahrb. **28,** 424 (1900). ? *B. gracilipes* Mildb. in Notizbl. Bot. Gart. Berl. **11,** 668 (1932). ? *B. hebecalyx* Gilg & Brehm. loc. cit. 414. *B. holstii* Gürke in Engl. Bot. Jahrb. **19,** Beibl. 47, 36 (1894). *B. integrifolia* A. Rich., Tent. Fl. Abyss. **1,** 107 (1847). *B. jaegeri* Gilg & Brehm. loc. cit. 304. ? *B. ninagongensis* Gürke in Wiss. Ergebn. Deutsch Zentr.-Afr.-Exped. 1907–8, **2,** 483 (1912). *B. serrata* A. Rich. loc. cit. 107. *B. suffruticosa* Brehm. loc. cit. 401. ? *B. volkensii* Gürke in Engl. Bot. Jahrb. **19,** Beibl. 47, 36 (1894).

i) subspecies *abyssinica* s. str. var. A

? *B. ussanguensis* Brehm. loc. cit. 400. *B. kandtii* Gilg & Brehm. loc. cit. 402.

B subspecies **paullinioides** (Planchon) comb. nov.

Natalia paullinioides Planch. in Hook. Fl. Nigrit. 252 (1849). *B. paullinioides* Baker in Fl. Trop. Afr. **1,** 435 (1868). *B. andongensis* Welw. ex Hiern, Cat. Welw. Afr. Plants **2,** 174 (1869). *B. angolensis* Bak. fil. Journ. Bot. **40,** 18 (1907). ? *B. bolamensis* Brehm. loc. cit. 396. ? *B. deiningeri* Brehm. loc. cit. 398. ? *B. deneckeana* Brehm. loc. cit. 410. ? *B. faucicola* Gilg & Brehm. loc. cit. 413. ? *B. kiwuensis* Gürke in Wiss. Ergebn. Deutsch Zentr.-Afr.-Exped. 1907–8, **9,** 483 (1912). *B. leiostegia* Stapf in Journ. Linn. Soc. **37,** 92 (1905). *B. lobulata* Sprague & Hutch. in Cat. Pl. Talbot, 21 (1913). ? *B. mildbraedii* Gürke loc. cit. 483. *B. oligoneura* Brehm. loc. cit. 404. ? *B. pachyneura* Gilg & Brehm. loc. cit.407. *B. pachythyrsa* Brehm. loc. cit. 399. *B. pallidinervia* Brehm. loc. cit. 408. *B. preussii* Bak. f. Journ. Bot. **45,** 16 (1907). ? *B. schweinfurthii* Brehm. loc. cit. 405. *B. subulata* Hutch. & Dalz. in Kew Bulletin **1929,** 27 (1929). *B. tessmannii* Brehm. loc. cit. 406. ? *B. xanthotricha* Gilg & Brehm. loc. cit. 397.

i) ssp. *paullinioides* variety A.

B. usambarica Gürke in Engl. Pflanzenr. Ost. Afr. C, 252 (1895).

ii) ssp. *paullinioides* variety B.

B. nyassae Bak. f. in Journ. Bot. **45,** 19 (1907). *B. schreberifolia* Brehm. loc. cit. 411. (This may eventually have to be placed with C).

iii) ssp. *paullinioides* variety C.

B. engleriana Gürke in Engl. Bot. Jahrb. **14,** 307 (1891). *B. leucotricha* Brehm. loc. cit. 409. (These two represent the extremes included here—many of the forms included under *paullinioides* above are probably best placed here, whether the rachis is winged or not).

iv) ssp. *paullinioides* variety D.

B. ugandensis Sprague in Journ. Linn. Soc. **37,** 512. *B. myriantha* Gilg & Brehm. l.c. 412. (*B. kiwuensis* Gürke probably belongs here).

v) ssp. *paullinioides* variety E.

B. maxima Baker in Fl. Trop. Afr. **1,** 434 (1868). (Possibly just a large form of B).

An account of the geographical variation follows and an attempt is made to indicate the application of the above varietal symbols, but only a close study of the actual material can do this properly.

Bersama abyssinica ssp. **abyssinica** s. str. Disc entirely annular or at least 4-lobed (Fig. 1 *c–g*). Leaf rachis nearly always non-alate. Leaflets usually entire and glabrous. Stamens 5, connate at the base. Bracteoles short. Functionally ♀ forms frequent. Fruit small, usually 1–2 cm. long, often grooved and reddish.

West Africa. The writer has seen no specimens of the genus from this district which had an entire or even a 4-lobed disc.

Cameroons & Congo.

(i) Forms with an entire disc. Leaf-rachis unwinged or very slightly winged on the final internode. Leaflets ± 7 cm. long, reticulate, glabrous, with petiolules 2 mm. long. Flowers small, sessile or very shortly pedicellate. Calyx covered with golden hairs. The forms seen from the eastern Congo (e.g. *Hendrickx* 1381) are very similar to non-alate forms of *paullinioides*.

(ii) Variety A

Form with disc as in Fig. 1*e*. Leaf-rachis slightly winged on the final internode. Leaflets 4–5 cm. broad, coppery brown above in the dried state with a moderate amount of matted yellow hairs beneath. Flowers sessile, calyx thick, densely fulvous-tomentose and hairy. Ruanda, *Kandt* 66.

Abyssinia.

(i) Typical *abyssinica*. Disc entire or 4 lobed. Leaf-rachis not winged. Leaves ± 5–6 (average)-jugate. Flowers small ± sessile. Calyx with whitish, yellow or reddish hairs, or often glabrescent (type has few hairs but possibly rubbed). Inflorescence up to 30 cm. long. Fruits small. Very many variations occur in the shape, width, margin and number of leaflets.

Uganda.

(i) Forms similar to typical *abyssinica* but often with larger entire or dentate leaflets, but still glabrous. Rachis not winged, glabrous. Calyx with yellow-brown hairs. Fruit 1–2 cm., grooved, often pinkish, e.g. *Burtt* 3256, *Dummer* 1411, *Scheffler* 303.

(ii) Similar to (i) but showing resemblance to *holstii* (see Kenya) in long pedicels. Calyx varying in hairiness e.g. *Maitland* 568, *Eggeling* 175, *Thomas* 6, *Eggeling* 5546, *African Staff* comm. *Brassnett* 112.

(iii) A form similar to above but leaflets large up to 16 × 6 cm. Final internode of rachis sometimes broadly alate. Bracteoles 1 mm. long.

Disc usually as in Fig. 1*d* but side lobes frequently quite short (Fig. 1*b*) *Snowden* 953 & 498.

KENYA.

(i) The prevalent form of *abyssinica* to be found in Kenya is equivalent to *B. holstii* Gürke. This has not been retained as a variety at present since there seems to be no end to the intermediates with typical *abyssinica*. Small tree, branches in herbarium material often very lenticellate. Leaves 4–9-jugate, rachis not winged. Leaflets ± (12×4) cm., rather oblong, glabrous, entire, and shortly petiolulate. Inflorescence usually long, up to 40 cm., either slender or coarse in appearance. Flowers small, 5–8 mm. long. Calyx reddish brown or purplish in the dry state, usually much less pubescent than in other forms. Sepals rounded. Stamens 4–6, connate (variable on same individual). Disc usually as fig. 1*d* sometimes complete or nearly so (fig. 1*e*, *f* & *g*). Fruit 2 cm. long, grooved, e.g. *Napier* 5342 from Kisii, and *van Someren* 5967 from Katmayo. *Elliott* 371 from Maramanda and *Baker* 325 from Mau are remarkable since they exactly match ! Their peculiar appearance however—elongate flowers and calyces—is due to some pathological condition. The stamens are galled.

TANGANYIKA.

(i) Forms identical with the Kenya form. The type of *B. holstii* Gürke came from Amboni near Tanga, close to the Kenya border. *Holst* 2432, *Porter* 3452 and *Bancroft* 43 from Meru are further examples. *Uhlig* 440. *St. Clair Thompson* 432 is the same galled form as *Elliott* 371 mentioned under Kenya.

(ii) Form near to (i) but with dentate leaves, winged rachis, hairy calyx and an entire disc. *Gillman* 106 from Kiao Island, Bukoba.

(iii) Forms of *abyssinica* with very silky yellow or brown (hairy) calyces. Rachis not winged. Leaflets small, ± elliptic—lanceolate to ovate —lanceolate, up to 10 × 4 cm. Stamens 5. Disc complete or 4 lobed. Rather a miscellaneous group of forms. *Staples* 158, *Greenway* 3092, *Hornby* 492, *Haarer* 1780, etc. *B. suffruticosa* belongs here but the leaves sometimes have a few hairs beneath.

(iv) Variety A. Similar to *Kandt* 66, from Ruanda. Leaf-rachis not winged. Leaflets sessile, ovate to ovate—lanceolate, slightly cordate at the base, entire and coriaceous, densely hairy beneath. Inflorescence, calyx, and leaf-rachis densely covered with yellow and brown hairs. Disc almost complete (as Fig. 1*e*). *Davies* E. 53, Elton Plateau, Livingstone Mountains. This variety is one of the more distinct ones since it is unusual to find correlation between very hairy leaves and an entire or nearly entire disc.

SOUTH TROPICAL AFRICA.

(i) Form close to *B. holstii* Gürke—see Kenya (i). Leaves 7-jugate, sessile, with petiolules 2–3 mm. long. Flowers small. Calyx brownish with less hair than other forms. *Brass* 17797 (Nyasaland).

(ii) Forms rather similar to typical *abyssinica* but with leaves of very various sizes. *Anthony* 17613, *Brass* 16173 (Nyasaland). There is incomplete material from Nyasaland and Northern Rhodesia which belongs here in all probability.

Bersama abyssinica ssp. **paullinioides** (Planch.) Verdcourt. Disc two-lobed (Fig. 1*a*) variable in size. Leaf-rachis not winged or very strongly winged. Planchon figures the leaf-rachis as being strongly winged but the type is only very narrowly so. In the west the two-lobed disc is commonly correlated with a non-winged or narrowly winged rachis, whereas in the east it is commonly correlated with a winged rachis. This is by no means a definite rule however. Stamens 4–5, often 4 with two connate and two almost free. Bracteoles often long.

West Africa.

(i) Typical *paullinioides*. Leaf-rachis not or very narrowly winged. Leaflets thin and not at all coriaceous (thinner than most E. African forms) usually quite glabrous, entire or somewhat toothed, small (7–15 cm. long) and usually very dark green or brownish in dry state. Leaves ± 9-jugate. Inflorescence 12–25 cm. long. Flowers small, about 1 cm. long. Pedicels about 0·5 cm. long and bracteoles 2 mm. long. Calyx usually not very hairy, hairs adpressed. Sepals short and rounded. Stamens usually 4, but not infrequently 4–5. Sierra Leone, Liberia and Nigeria. *B. subulata* Hutch. & Dalz. and *B. lobulata* Sprague & Hutch. belong here, as well as *B. paullinioides* s. str.

(ii) Forms similar to the above but possessing a markedly winged leaf-rachis are much rare but occur in the Ivory Coast and Gold Coast. Intermediates between (i) and (ii) abound, and other forms with larger leaves occur. *B. leiostegia* Stapf and *B. pachythyrsa* Brehm. are intermediates. In some instances single large leaves have been made the type of new species, but they are of course not comparable with the leaves accompanying the inflorescences.

(iii) *Lely* P156 from Bauchi, N. Nigeria shows very close affinities with variety C. from Uganda. It is practically identical with *Thomas* 1979 from W. Nile district of Uganda. Leaf-rachis winged. Leaflets coriaceous, prominently veined, pale green below and pale lead-coloured above with a few hairs on the midrib only. Inflorescence 30–40 cm. long. Calyx and pedicels covered with brownish-golden hairs.

Congo & Cameroons.

(i) Forms close to (ii) from West Africa occur, but they mostly have more coriaceous-glabrous leaflets approaching those of form (iii) from West Africa. Upper internodes of leaf-rachis sometimes moderately winged (" subalate " forms) or whole rachis not winged. Pedicels up to 1 cm. long. Bracteoles up to 5 mm. long. Calyx and pedicels are densely covered with buff or golden pubescence. Anterior sepals may be joined for only half their length. *B. tessmannii* Brehm. and *B. pallidinervia* Brehm. belong here. The number of stamens is predominantly 4 but 5 do occur.

(ii) *Lebrun* 7099 is a subalate form with the undersides of the leaves covered with a dense recumbent grey-buff indumentum.

(iii) Forms with affinities to var. B occur in the Katanga province of the Belgian Congo (e.g. *Ringoet* 113). Leaf-rachis broadly alate. Leaflets sparsely hairy beneath. Calyx, pedicels, peduncles and

branches covered with gold hairs. Sepals rather narrow and acute, unlike the forms so far mentioned.

(iv) Variety E. Form with large leaves and flowers. Upper internodes of rachis broadly winged. Leaflets (of detached leaves) up to 20 cm. long, pubescent below when young (only the detached leaves not subtending an inflorescence have such big leaflets, but material is incomplete). Peduncles, rachis and inflorescence covered with golden pubescence. Pedicels up to 1·5 cm. long. Bracteoles ± 6 mm. Stamens 4.

(v) *Le Testu* 2055 from the Gaboon is similar to variety E, but lower pedicels up to 2·5 cm. long. Leaves with lower surfaces covered with a more dense golden indumentum.

Abyssinia.

(i) Forms with leaf-rachis not winged. Leaves 4–5-jugate. Leaflets small, glabrous, entire or serrate. Flowers ± sessile. Bracteoles small. Stamens 5. Seems very close to true *abyssinica* despite the two-lobed disc. *B. oligoneura* Brehm. belongs here. It was described from fruiting material but it appears to have a two-lobed disc.

(ii) Forms close to (i) but with such variations as leaves 7–9-jugate, leaf-rachis alate, pedicels up to 1 cm. long. Calyx densely brown-fulvous-tomentose. Mostly referable to var. C.

Uganda.

Forms of ssp. *paullinioides* are very common in Uganda. These are often only to be distinguished from true *abyssinica* by the two-lobed disc. Other characters such as winging of leaf-rachis and bracteole length are not constant. The fruit is usually large, 2–3 cm. or more long and not grooved.

(i) Variety C. This is extremely variable and the two extreme limits correspond to *B. engleriana* Gürke and *B. leucotricha* Brehm. Every possible intermediate may be found.

(a) Leaf-rachis usually winged, but sometimes very narrowly so or quite unwinged, with golden-brown pubescence. Leaflets small, about 7 × 2 cm., conspicuously dentate, undersides moderately velvety hairy, but occasionally glabrous, often pale grey or coppery above, and pale greenish-brown below in the dry state, with ± 10 main veins on each side. Internodes of leaf-rachis 1·5–2 cm. long. Inflorescence with golden-brown pubescence or glabrous, up to 30 cm. long. Flowers small, under 1 cm. long, pedicels ± 5 mm. long. Bracteoles 6–7 mm. long. Calyx with golden-brown pubescence. Stamens 4–5. (=*B. leucotricha* Brehm.) *Evans* 739, *Scott Elliot* 7027, *Kennedy* 1264.

(b) Similar to (a) but leaflets larger, up to 9–10 × 2·5–3 cm., more often entire but sometimes dentate, more often glabrous but sometimes hairy. Internodes of leaf-rachis 3–4 cm. long. Stamens 4–5.

(=*B. engleriana* Gürke) *Eggeling* 3009, *Snowden* 154. *Eggeling* 2584 and 1804 (with entire leaflets). *Eggeling* 3566 and 1836 (with non-alate leaf-rachis).

Variety B is closely related to this and there are many intermediates.

(ii) Variety D
Form with moderately large leaflets up to 14 × 5 cm., entire or sharply serrate, velvety-pubescent beneath, about 15 lateral nerves. Flowers 1–1·5 cm., pedicels up to 1 cm., bracteoles about 7 mm. Leaf-rachis broadly to narrowly winged. Calyx and inflorescence with golden hairs. Stamens 4, two connate and two free. *Dawe* 382 and *Purseglove* 2527.

(iii) Form allied to (i) and (ii). Leaf-rachis winged, leaflets 14 × 4 cm. glabrous. Flowers 1 cm. long and pedicels up to 12 mm. *Sangster* 651.

Kenya.

(i) Variety C
The same form as Uganda (i). The type of *B. leucotricha* Brehm. comes from Kenya—*Powell* 107. *Jackson* 325 is another example.

Tanganyika.

(i) Variety C
The same form as Uganda (i) e.g. *Bruce* 66, *Davies* 307, *Jessel* 51. A similar form with small leaflets (6 × 1·5 cm.) having many nerves (up to 15 on either side), but leaf rachis not winged. Sepals acute. There is not enough material to show how distinct it is. *Adamson* 67, "*Conservator of Forests* 749" ex Imperial Forestry Institute, Oxford. (No further data).

(ii) Variety A
Leaf-rachis winged. Leaflets of leaves subtending inflorescences 10 cm. × 4 cm., other leaves with leaflets up to 22 cm. × 8 cm. in cultivated specimens, glabrous, slightly dentate or quite entire. Flowers large, 1–1·5 cm. long, pedicels and bracteoles up to 1 cm. long. Calyx fairly densely covered with golden hairs. Sepals often quite acute. Stamens 4, two connate and two free.

(iii) Variety D
Similar to (ii) but leaflets densely velvety beneath, entire, veins ± 15 on either side. Flowers, pedicels and bracteoles similar to (ii). (=*B. myriantha* Gilg & Brehm. from Kyimbila).

(iv) Variety B
Gillman 1295 from Lindi District is very similar to this.

(v) *Greenway* 6791 from Mbulumbulu. Leaf-rachis not winged. Leaflets large, oblong-ovate, glabrous. Inflorescence very like the *holstii* form of *abyssinica* s. str. Flowers small. Bracteoles very short. Calyx brownish not very hairy. Possibly an *abyssinica* with unusual two-lobed disc.

South Tropical Africa.

(1) Variety B
Leaf-rachis winged, very often broadly so. Leaflets usually entire

but occasionally serrate, up to 10 × 4 cm., with a very variable amount of yellow hair beneath—densely hairy to almost glabrous. Inflorescence and branches with golden-brown hairs. Flowers often ± sessile but lower pedicels sometimes up to 8 mm. long. Bracteoles up to 5 mm. long. Calyx densely covered with yellow brown or golden hair. Stamens 4–5, e.g. *Brass* 16163, *Johnston* 97, *Purves* 197. (=*B. schreberifolia* Brehm.).

This variety is very similar to variety C but the leaves of B are hairier and often broader. *Lugard* 239 from Elgon is very similar to *Purves* 197.

B. zombensis Dunkley, Kew Bulletin, **1937,** 470, is very similar in many ways but it has not been sunk into the *abyssinica* complex since little information is available. The leaves of the type are exceedingly densely covered beneath with yellow hairs and most of the parts are more hairy. It is *said* to be a very large timber tree whereas var. B is a smallish tree. Certain sheets however which are referred to *B. zombensis* are indistinguishable from var. B. The disc shows that *B. zombensis* agrees with ssp. *paullinioides*. Nyasaland.

(ii) Cf. variety C.
Forms very close to some Uganda material, but with practically unwinged rachis. *Gossweiler* 8708. *B. andongensis* Hiern belongs here. Angola.

B. angolensis Welw. ex Hiern is similar but has a more markedly winged rachis and broader elliptic leaflets. Angola.

(iii) *Miller* D 172 from Northern Rhodesia is very similar to *Adamson* 67 (see Tanganyika, form (i)).

(iv) *Gossweiler* 9959 and 9842 are closely allied to variety D. They are both forms with large leaflets having very hairy undersides.

(v) *Gossweiler* 8066 and *Welwitsch* 1699 are also forms with large oblong leaflets but only the veins are hairy below to any extent. They would appear to be close to var. E.

This formidable list of forms will serve to show how great is the range of variation ; yet in spite of the very distinct appearance of certain plants it is not possible to find a structural character which holds good.

Of the forms which have not been sunk into *B. abyssinica* Fres. agg. the writer has little to say.

Bersamaide acutidens Welw. ex Hiern Cat. Welw. Afr. Plants 173, **1,** (1869) =*B. gossweileri* Bak. f. in Journ. Bot. **45,** 17, (1907).

This resembles a very large form of *B. abyssinica* ssp. *paullinioides* and may be very closely related, since there are large forms of the latter e.g. "*B. leiostegia* Stapf". Welwitsch stated that the leaves of one plant could be both winged and unwinged and the leaflets serrate or entire. Further material is needed to decide its status. *Wild* 2220 from Southern Rhodesia (fruiting material from a sapling of a tree 80′ high) is certainly the same form. Rachis winged, in one leaf (very young) the final alation is toothed. Leaflets large, serrate, 16 × 6 cm. Fruit 3·5–4 cm. long when full mature, not grooved, pubescent.

B. lucens (Hochst.) Szyszyl. in Rozpr. i Spraw. Akad. Umiej. **18,** 50 (1888) is a very distinct species from South Africa with obovate, obtuse, cuneate leaflets which have distinctly different venation. Leaves 1–3-jugate only. Fruit rugose. Stigma not capitate. Disc two-lobed.

B. rosea Hoyle in Kew Bulletin **1931,** 96. Mr. J. P. M. Brenan who has seen this plant many times in the field says that it seems to be the one tropical species of the genus that is certain. The habit, (a small shrub), the bright red flowers, and the short slender inflorescence appear to distinguish it from other *Bersama* species. But although the latter have white flowers one sometimes finds in the notes " tinged with pink ". The disc in *B. rosea* is entire or 4-lobed and the rachides of the leaves are not winged. The species thus shows affinities with *B. abyssinica* Fres. ssp. *abyssinica* s. str. Stamens 4–5. R. M. Davies writes concerning his specimen D.935 from Mufindi, Tanganyika—" specimen only a few feet high—becomes a forest tree ". This needs investigating.

B. stayneri Phillips in Bothalia **1,** 37, 63 (1921) from Natal seems distinct, from the description. No material has been seen.

B. swinnyi Phillips in Bothalia **1,** 36 (1921) from Pondoland is very distinct and readily distinguished by its extraordinarily condensed inflorescence and elliptic leaves.

B. swynnertonii Bak. fil. in Journ. Bot. **45,** 14 (1907) from Rhodesia is distinct. It seems intermediate between *B. lucens* and the tropical aggregate in many ways. Rachis not winged. Leaves 1–3-jugate. Flowers small, pink, Stigma not capitate. Fruit slightly rugose. Inflorescence short. Not re-collected.

B. transvaalensis Turrill in Kew Bulletin **1931,** 299. This is similar to the next species but has larger leaflets, longer racemes and a more echinate fruit, which, however, looks suspiciously pathological and galled.

B. tysoniana Oliv. in Hook. Icon. Pl. **23,** t. 2267 (1893). Quite distinct on account of its tuberculate fruits.

" *Bersama* " *mossambicensis* Sim, For. Fl. Port. E. Africa, 34, (1909), is, as Sim himself suggests, not a *Bersama* at all. It has a quite different venation. Sim states that his plant had 14–15 stamens which would seem to rule out *Melianthaceae* altogether. There are fruiting specimens at Kew from localities as distant as Kenya Colony and Zululand (*H. H. Curson*). Until good flowering material correlated with fruiting material has been obtained, the true position of this species will have to remain uncertain.

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NOTES ON TROPICAL WEST AFRICAN SPECIES OF COMBRETUM : I

R. W. J. Keay

In the Flora of West Tropical Africa (1927) Hutchinson and Dalziel recognised 46 species of *Combretum*. Their key to the genus is admittedly artificial and is not related to the sections proposed by Engler and Diels (1899) in their monograph of the African species. Important characters in Hutchinson and Dalziel's key include leaf-shape, indumentum on leaves and flowers, and whether or not the inflorescence is branched. Unfortunately these characters are far from constant in several species and sometimes even on individual plants. Thus in this Flora several species are maintained which can no longer be regarded as distinct. Some of the species newly described in the Flora have proved to be synonymous with previously described species, others have been omitted, and altogether the need for revision is evident.

Roberty (Candollea **11,** 39 : 1947) has published a revision of the West African species based upon material in the Geneva herbarium. Roberty's concept of a species is, however, so unorthodox and his taxonomy so open to criticism that few botanists are likely to accept his conclusions. Some of Roberty's " species " correspond roughly with Engler and Diels' sections, but in other " species " he lumps together as " sub-species ", " varieties " or " forms " several species which most botanists regard not only as distinct, but as belonging to different sections. The savanna trees of §*Glabripetalae* and §*Ciliatipetalae*, for instance, are lumped under *C. glutinosum* Perr. ex DC., while most of the smaller flowered forest climbers come under *C. mucronatum* Schumach & Thonn.

Roberty's treatment of two other species may be mentioned here as examples of his revision. *C. acutum* Laws. is reduced to *C. mucronatum* Schumach & Thonn. forma *acutum* (Laws.) Roberty with *C. afzelii* Engl. & Diels as a synonym ; the specimen *Lebrun* 883 which he cites is *C. cuspidatum* Planch. ex Benth., according to the duplicate in Kew. Now *C. smeathmannii* G. Don (=*C. mucronatum*) comes into §*Mucronatae*, *C. cuspidatum* Planch. ex Benth. (=*C. afzelii* Engl. & Diels) into §*Combretastrum*, and *C. acutum* Laws. which was unplaced by Engler & Diels is distinct enough to need a new section, §*Acutae* (vide infra).

Roberty evidently did not see the type of *C. bauchiense* Hutch. & Dalz., but because the authors described it as " affinis *C. herbaceo* G. Don, sed foliis infra glandulosis vel glabris, ovario et calyce leviter pubescente differt ", Roberty decided that it is no more than a glabrous variety of *C. herbaceum* G. Don. Now an examination of the type of *C. bauchiense* shows that it should come into §*Glabripetalae* with strong affinities to savanna trees of the *C. ghasalense* Engl. & Diels alliance, whereas *C. sericeum* G. Don (=*C. herbaceum*) is allied to forest climbers of §*Conniventes* (including §*Parvulae*) ; thus *C. bauchiense* is not only specifically distinct from *C. sericeum*, but sectionally also.

The need for revision is therefore as great as ever. To attempt a revision of the West African species alone would be unsatisfactory, but the time is not yet ripe for a revision of the genus as a whole. In the meantime it seems best to work as far as possible within the framework of the

sections proposed by Engler and Diels. Within some of these sections it has been possible to revise and to construct keys for the West African species, and the results are published in this paper. In other sections, however, much further work is needed and it seems wise to postpone publication.

The work upon which this paper is based has been carried out at intervals during the past five years in the field in Nigeria and in British herbaria. The co-ordination of field collecting with herbarium work has been particularly rewarding, especially in assessing the value of characters such as leaf-shape and degree of indumentum, and in matching flowering and fruting stages. I am indebted to the Directors of the Royal Botanic Gardens, Kew and of the Imperial Forestry Institute, Oxford, to the Keeper of Botany at the British Museum and to the Chief Conservator of Forests, Nigeria, for facilities afforded. I am also greatly indebted to Mr. A. W. Exell, who for many years has made a special study of the genus, for expert advice and assistance at various stages of my work.

The conspectus published below shows the sections and species at present known in the area of Hutchinson and Dalziel's Flora of West Tropical Africa. There appear to be at least 8 species of savanna trees in §*Glabripetalae*, but as several unsolved problems of taxonomy and nomenclature are involved these species are omitted from the present conspectus. A useful account of some of the *Glabripetalae* has recently been given by Aubréville (Les Combretum des Savanes Boisées de l' A.O.F., 1944). Also in Aubréville's paper are three new species (lacking Latin descriptions) –*C. etessei* Aubrév., *C. nioroensis* Aubrév., *C. maclaudii* Aubrév.—which I have been unable to place owing to lack of authentic material

Conspectus of *Combretum* Loeffl. in the area of Hutchinson and Dalziel's Flora of West Tropical Africa.

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§**Tomentosae** Engl. et Diels
C. tomentosum G. Don

§**Paucinerves** Engl. et Diels
C. micranthum G. Don
C. homalioides Hutch. et Dalz.
C. demeusei De Wild.
C. obanense (Bak. f.) Hutch. et Dalz.

§**Combretastrum** Eichl. incl. §*Olivaceae* Engl. et Diels]
C. cuspidatum Planch. ex Benth.
C. insulare Engl. et Diels

§**Mucronatae** Engl. et Diels
C. smeathmannii G. Don

§**Ciliatipetalae** Engl. et Diels
C. nigricans Lepr. ex Guill. et Perr., and var. *elliotii* (Engl. et Diels) Aubrév.
C. velutinum DC., and " variété glabre " of Aubréville

§**Glabripetalae** Engl. et Diels
Several savanna trees ; the suffrutices *C. bauchiense* Hutch. et Dalz. and *C. relictum* Hutch. et Dalz. ; and the scandent shrub *C. oyemense* Exell

§**Capituliformes** Engl. et Diels
C. zenkeri Engl. et Diels

§**Conniventes** Engl. et Diels [incl. §*Parvulae* Engl. et Diels]
C. paniculatum Vent. (aggr.)
C. confertum Laws.
C. calobotrys Engl. et Diels
C. lecardii Engl. et Diels
C. mannii Engl. et Diels
C. tarquense J. J. Clark
C. sericeum G. Don

§**Acutae** Keay, sect. nov. (vide infra)
C. acutum Laws.

§**Fuscae** Engl. et Diels
C. fuscum Planch. ex Benth.
C. bipindense Engl. et Diels
C. sordidum Exell
C. batesii Exell
C. fulvum Keay, sp. nov. (vide infra)

§**Racemosae** Engl. et Diels
C. racemosum P. Beauv., et var. *flammeum* Welw. ex Laws.
C. cinereipetalum Engl. et Diels

§**Grandiflorae** Engl. et Diels
C. grandiflorum G. Don
C. comosum G. Don
C. hispidum Laws.
C. dolichopetalum Engl. et Diels
C. rhodanthum Engl. et Diels (?)

§**Trichopetalae** Engl. et Diels
C. aculeatum Vent.
C. constrictum Laws.

§**Cacoucia** (Aubl.) Engl. et Diels
C. platypterum (Welw.) Hutch. et Dalz.
C. bracteatum Engl. et Diels
C. mooreanum Exell

§*Campylogyne* Engl. et Diels is excluded, having been transferred by Exell (Journ. Bot. **68,** 1930) to the genus *Quisqualis* Linn. The systematic position of the suffrutescent species is discussed elsewhere and §*Parvulae* Engl. et Diels is included in §*Conniventes* Engl. et Diels. Owing to lack of material Engler and Diels were unable to place *C. acutum* Laws., but an examination of the adequate material now available at Kew shows that a new section is required ; it is described as follows :—

> §**Acutae** Keay. Sectio nova, a §*Lasiopetalis* Engl. et Diels qua affinis, staminibus inclusis quam receptaculum superius brevioribus, stylo haud exserto, petalis orbicularibus distincta. Typus : *Combretum acutum* Laws.

Flores 5-meri, sessiles. *Receptaculum* inferius fusiforme, superius campanulatum ; discus inconspicuus adanatus. *Petala* epilosa, orbicularia, breviter unguiculata. *Stamina* 10, inclusa, quam receptaculum superius breviora, filamentis brevissimis. *Stylus* receptaculo superiori aequilongus, non exsertus.

In the citations which follow the specimens are in the Herbarium of the Royal Botanic Gardens, Kew, unless otherwise stated. Abbreviations for other herbaria are :—

Hb. Brit. Mus.—Herbarium of the British Museum (Nat. Hist.)
Hb. Imp. For. Inst. Oxon.—Herbarium of the Imperial Forestry Institute, Oxford.
Hb. Fielding—Fielding's Herbarium in the School of Botany, Oxford University.
For. Hb. Ib.—Forest Herbarium, Ibadan, Nigeria.

Sect. Tomentosae Engl. et Diels

C. tomentosum *G. Don* in Edin. Phil. Journ. **11,** 346 (1824) ; Lawson in Oliv. Flor. Trop. Afr. **2,** 430 (1871), pro parte, excl. spec. *Kirk*. ex Batoka et Tette ; Engl. et Diels, Monogr. Afr. Pflz. **3,** 16 (1899), excl. spec. *Kirk* ; Hutchinson et Dalziel, Flor. W. Trop. Afr. **1,** 218, 221 (1927) ; Roberty in Candollea **11,** 81 (1947).
C. chrysophyllum Guill. et Perr., Flor. Senegamb., 289 (1833).

Senegal. *Heudolot* 375 (1839).

French Guinea. Farana, alt. c. 1070 m., lat. 10°N., plateau east of Niger, *Scott Elliot* 5364 (frts. Mar. 1892) ; Kouroussa, *Pobeguin* 642 (fls. Feb. 1901) ; Timbo Kouria, *Chevalier* 14778 (fls. Dec. 1905) [Hb. Brit. Mus.] ; between Mamon and Dalaba, *Dalziel* 8407 (fls. Mar. 1927).

French Sudan. Sicoro near Bammako, *Chevalier* 212 (fls. Jan. 1899).

Sierra Leone. *Afzelius* s.n. [Hb. Brit. Mus.] ; Scarcies near Kukuna, *Scott Elliot* 4666 (fls. Jan. 1892).

In the Flora of Tropical Africa Lawson cited as this species specimens collected by Kirk in the highlands of Bakota country and at Tette on the Zambesi. These specimens are at Kew, and although rather poor certainly belong to §*Breviramae* and are not *C. tomentosum* G. Don. It appears therefore that *C. tomentosum* is confined to the western part of tropical West Africa.

This is the only West African species of §*Tomentosae*. The leading characters of this section are the very shallow upper receptacle which leaves the disc fully exposed even in pressed specimens and the stamens which are shorter than the petals. *C. tomentosum* is a scandent shrub clothed with dense brownish tomentum on the inflorescences young branches and on the lower surface of the leaves.

Sect. Paucinerves Engl. et Diels

This section includes three rare species of the rain forest, as well as *C. micranthum* G. Don, a common plant of the drier savanna regions. The species of this section have a shallow upper receptacle which does not con-

ceal the disc even in pressed specimens ; the stamens are longer than the petals ; scales are usually present.

A. Flower spikes lax in ample panicles ; mature leaves usually over 6 cm. long ; rain forest species.

  a. Flower spikes up to 5 cm. long ; leaves cuneate at the base, glabrous but glandular below, with pits in the axils of the main nerves ; inflorescence-axes pubescent, lower receptacle with abundant whitish scales, upper receptacle glabrous or sparsely pubescent outside . . . . . *C. obanense*

  b. Flower spikes usually at least 5 cm. long ; leaves cordate or rounded at the base.

    i. Leaves glabrous shining, pits in the axils of the main nerves, ultimate veins raised beneath ; inflorescence-axes shortly pubescent and with sparse red scales, lower receptacle glabrous viscid, upper receptacle glabrous outside . . . . . *C. homalioides*

    ii. Leaves pubescent on the mid rib below and petiole, without pits, ultimate veins not raised beneath ; inflorescence-axes and upper and lower receptacle pubescent and with abundant red scales . . *C. demeusei*

B. Flower spikes dense, up to 3 cm. long, usually solitary in the leaf axil ; mature leaves usually less than 6 cm. long (rarely up to 9 cm.) cuneate at the base ; inflorescence-axes and upper and lower receptacle with abundant red scales ; savanna species *C. micranthum*

C. obanense (*Bak. f.*) *Hutch. et Dalz.*, Flor. W. Trop. Afr. **1,** 219, 221 (1927) et in Kew Bull. **1928,** 228 (1928) ; Exell in Journ. Bot. **67,** 101 (1929).

C. paucinervium Engl. et Diels var. *obanense* Bak. f. in Cat. Talbot's Nigerian Pl., 38 (1913).

C. micranthum G. Don var. *obanense* (Bak. f.) Roberty forma *obanense* (Bak. f.) Roberty in Candollea **11,** 84 (1947), quoad syn. *C. obanense* (Bak. f.) Hutch. et Dalz.

The type-gathering is still the only record from the area of the Flora of West Tropical Africa. The species is also known in the Gaboon (e.g. *Le Testu* 9353, in Hb. Brit. Mus. et Hb. Kew).

C. homalioides *Hutch. et Dalz.*, Flor. W. Trop. Afr. **1,** 219, 221 (1927) et in Kew Bull. **1928,** 225 (1928) ; Exell in Journ. Bot. **66,** Suppl. Polypet., 165 (1928).

C. micranthum G. Don var. *obanense* (Bak. f.) Roberty forma *homalioides* (Hutch. et Dalz.) Roberty in Candollea **11,** 84 (1947), quoad syn. *C homalioides* Hutch. et Dalz.

Nigeria. Onitsha, *Barter* 1803 [typus in Hb. Kew] ; Onitsha Province ; Udi Forest Reserve, *J. Smith* 33 (fls. Nov. 1928) [Hb. Brit. Mus. ; For Hb. Ib.]

Barter described the type-gathering as " Tree, 60 feet. Flowers white, scenting the whole forest ". The specimen has however every appearance of being a liane like other members of §*Paucinerves*, and the existence of a *Combretum* as a forest tree 60 feet high seems most unlikely. It is

reasonable to suppose that Barter saw the plant climbing high up on a tree and mistook it for the tree itself. Unfortunately Smith's specimen lacks notes about habit.

Exell (l.c.) has identified *Gossweiler* 8787 from the Portuguese Congo with this species, but " with some reserve, as there is only this one specimen from the Portuguese Congo to compare with the single specimen known from the type locality ". The Congo specimen has somewhat smaller and more rounded leaves but otherwise agrees very well with the type. In view of the variation in size of leaf which is known to occur in single plants of this genus, it seems likely that the Congo specimen is in fact *C. homalioides*.

C. demeusei *De Wild.* in Ann. Mus. Congo, sér. 5, **3,** 235 (1910) ; Exell in Journ. Bot. **67,** 103 (1929).

C. mildbraedii Hutch. et Dalz. in Flor. W. Trop. Afr. **1,** 218, 221 (1927) et in Kew Bull. 1928, 225 (1928).

C. micranthum G. Don var. *typicum* Roberty forma *mildbraedii* (Hutch. et Dalz.) Roberty in Candollea **11,** 83 (1947), quoad syn. *C. mildbraedii* Hutch. et Dalz.

French Guinea. Timbo, Kouria et environs, *Chevalier* 14792 (fls. Nov. 1905) ; without locality, *Chevalier* 15113.

Gold Coast. Western Province, Essiama, *Irvine* 2317 (frts. Feb. 1934) ; Hohoe District, near Alavanyo, *St. Clair Thompson, Gold Coast F.D. Herb. No.* 3660 (fls. Nov. 1934) [Hb. Imp. For. Inst. Oxon.].

Togoland. Misahohe, *Mildbraed* 7305 (fls. Nov. 1913) [typus *C. mildbraedii* Hutch. et Dalz. in Hb. Kew.].

Nigeria. Onitsha Province, Enugu Forest Reserve, *J. Smith* 23 (fls. Oct. 1928) [Hb. Brit. Mus. ; For. Hb. Ib.].

The type-specimens of *C. demeusei* were collected in the Belgian Congo and when Exell (l.c.) identified *C. mildbraedii* with it the species appeared to have a markedly discontinuous distribution. Specimens have however since been collected in the Gold Coast, Nigeria and Gaboon and it is evident that this is a widespread but rare species. *Smith* 23 is described as a " shrub of fringing forest ".

Irvine 2317 is the only specimen in Kew with fruits ; these are broadly elliptic, emarginate at the apex and from 1·6 to 2 cm. long. They differ somewhat from the acutely ovate fruits shown in De Wildeman's original plate (t. 49, l.c.) but these are possibly immature.

C. micranthum *G. Don.* in Edin. Phil. Journ. **11,** 347 (1824) ; Guillemin et Perrottet, Flor. Senegamb., 287 (1833) ; Engler et Diels, Monogr. Afr. Pflz. **3,** 17 (1899) ; Hutch. et Dalz., Flor. W. Trop. Afr. **1,** 217, (1927) ; Aubréville, Combret. des Sav. Bois. A.O.F., 27–30 (1944).

C. parviflorum Rchb. Ic. Bot. Exot. 46, t. 62 (1827).

C. altum Perr. in DC. Prodr. **3,** 20 (1828), et in DC. Mém. Comb., 34 (1828) ; Guillemin et Perrottet, Flor. Senegamb., 287 (1833) ; Lawson in Oliv. Flor. Trop. Afr. **2,** 428 (1871) ; Engl. et Diels, l.c., 18 (1899).

Bureava crotonoides Baill. in Adansonia **1,** 72 (1860) [fide Engler et Diels].

C. raimbaultii Heckel in Rep. Pharm., 627 (1891) [fide Engler et Diels].

[*C. micranthum* G. Don var. *typicum* Roberty forma *paucinervium* [non (Engl. et Diels) Roberty] Roberty in Candollea **11,** 82 (1947), quoad syn. *C. micranthum* G. Don sensu stricto, non quoad syn. *C. paucinervium* Engl. et Diels, l.c. 17 (1899).]

C. micranthum G. Don var. *typicum* Roberty forma *altum* (Perr.) Roberty, l.c. 83 (1947), quoad syn. *C. altum* Perr.

Senegal. *Sieber* 25 *Heudelot* 284 (1839).

Gambia. *M. T. Dawe* 83.

Portuguese Guinea. Pussube, *Joaquim Viegas* 1185 (fls. Jun. 1938).

French Guinea. *Heudelot* 812 ; *Leo Farmar* 191.

French Sudan. Gourma, de Fada à Koupela, *Chevalier* 24517 (fls. and young frts. July 1910).

Sierra Leone. Scarcies River, on the way to Kukuna, *Scott Elliot* 4702a (frts. Jan. 1892) ; *Scott Elliot* 4753.

Gold Coast. *T. Lloyd Williams* 521.

French Niger. Niamey–Zinder, *Hagerup* 568a (frts. Oct. 1927).

Nigeria. Nupe, *Barter* 1645 & 1711 ; Sokoto, *Dalziel* 429 (fls. Jul. 1910).

[N.B. The above citation has been limited to one or two specimens per country only].

This species is widespread and frequent in the Sudan and Sahel zones of West Africa, but appears to reach the limit of its range somewhere in north-eastern Nigeria.

Usually *C. micranthum* is found as a low shrub but it is recorded as a small tree in Senegal and I have also seen it as a liane in Nigeria. Arborescent specimens have been named *C. altum* Perr. and Roberty (l.c.) uses the name *floribundum* as a *forma* for what is evidently the sarmentose state. It appears however that the habit of this species depends largely on external influences. The impression gained during an ecological survey of a part of Sokoto Province (see Keay in Journ. Ecol. **37,** 335-364 : 1950) was that the natural state of this species is as a liane but that repeated burning and cutting produce the low shrubby state in which it is usually seen.

[**C. paucinervium** Engl. et Diels, Monogr. Afr. Pflz. **3,** 17 (1899).

Engler and Diels stated that the type (*Mann* 1817) was probably collected in the Cameroons. On the iso-type at Kew, however, the locality is noted as " River Kongui, Lat. 1°N ". This is in Spanish Guinea and outside the area of the Flora of West Tropical Africa.]

Doubtful and excluded species of Sect. Paucinerves.

C. floribundum Engl. et Diels, l.c., 18 (1899).

This is included by Hutchinson and Dalziel as a synonym of *C. micranthum* G. Don, but I have not seen the type specimens (*Lecard* 63 and 72).

C. nigricans Lepr. ex Guill. et Perr., Flor. Senegamb. 290 (1833).

As Exell has pointed out (Journ. Bot. **67,** 141, 1929) this species should be transferred to §*Ciliatipetalae*.

Sect. Combretastrum Eichl.

(Sect. *Olivaceae* Engl. et Diels)

This section includes two forest climbers in West Tropical Africa. One of them, *C. cuspidatum*, is widespread from Sierra Leone to the Belgian Congo, while the other, *C. insulare*, in so far known only from single localities in Fernando Po, the Cameroons and Nigeria. Species of this section have small tetramerous flowers with a campanulate upper receptacle ; the disc is poorly developed and has no free edge.

A. Fruit orbicular, emarginate at the apex, yellow-brown, with wide papery wings ; leaves chartaceous, drying pale brown or dull green ; main lateral nerves markedly looped near the margin, tertiary nerves almost at right angles to the main laterals ; upper receptacle drying pale pinkish-brown . . . . . *C. insulare*

B. Fruit ovate with long beak, dark brown, with thick narrow wings ; leaves coriaceous, drying dark brown, grey or black ; main lateral nerves not markedly looped, tertiary nerves at an acute angle to the main laterals ; upper receptacle drying dark brown or black . . *C. cuspidatum*

C. insulare *Engl. et Diels*, Monogr. Afr. Pflz. **3,** 21 (1899) ; Hutchinson et Dalziel, Flor, W. Trop. Afr. **1,** 219, 221 (1927).

[*C. cuspidatum* (non Planch. ex Benth.) Laws. in Oliv. Flor. Trop. Afr. **2,** 426 (1871), pro parte, quoad spec. *Mann* ex Fernando Po.]

[*C. mucronatum* Schumach. et Thonn. forma *cuspidatum* (Planch. ex Benth.) Roberty in Candollea **11,** 84 (1947), pro parte, quoad syn. *C. insulare* Engl. et Diels]

Nigeria. Oyo Province, Ibadan North Forest Reserve, *Chizea* in For. Hb. Ib. No. 23971 (frts. Febr. 1950).

Brit. Cameroons. Victoria, sea level, *Maitland* 380 (frts. Feb. 1929) ; same locality, *Maitland* 773 (fls. Nov. 1929) ; Victoria, alt. 100 feet, *Maitland* 1061 (frts. Mar. 1930). [all three specimens are also in For. Hb. Ib.]

Fernando Po. *Mann* 1156 (fls. 1861) [Iso-typus in Hb. Kew.].

This species was described in absence of fruits and was distinguished from *C. cuspidatum* Planch. ex Benth. on account of the nervation of the leaves. The identification of Maitland's specimens with Mann's type shows that the fruits are quite different from those of *C. cuspidatum*. The fruit, hitherto unknown, may be described as follows :—

Fructus quadrialatus, sub-orbicularis vel oblongus, circiter 3·8 cm. longus, 2–3·5 cm. latus, pallide brunneus, nitens, glaber, basi sinu late triangulari, apice emarginatus, alis quam corpus duplo latioribus, chartaceis.

C. cuspidatum *Planch. ex Benth. in Hook.*, Flor. Nigritiana, 340 (1849) ; Lawson in Oliv. Flor. Trop. Afr. **2,** 426 (1871), pro parte, excl. spec.

Barter 1803 ; Engler et Diels, Monogr. Afr. Pfl . **3,** 21 (1899), pro parte, excl. spec. *Barter* 1803 ; Hutch. et Dalz., Flor. W. Trop. Afr. **1,** 219, 221 (1927).

[*C. afzelii* (non G. Don) Engl. et Diels l.c. 22 (1899), Hutch. et Dalz. l.c., 219, 221 (1927).]

C. conchipetalum Engl. et Diels, l.c. 22 (1899), Le Testu et Exell in Bull. Soc. Linn. Normandie, sér. 8, **9,** 127 (1936).

C. calvescens Exell in Journ. Bot. **67,** 103 (1929).

C. mucronatum Schumach. et Thonn. formae *cuspidatum* (Planch. ex Benth.) Roberty, et *conchipetalum* (Engl. et Diels) Roberty in Candollea **11,** 85 (1947).

C. mucronatum Schumach. et Thonn. forma *acutum* (Laws.) Roberty l.c., 85 (1947), quoad syn. *C. afzelii* Engl. et Diels, quoad spec. *Lebrun* 883, non quoad syn. *C. acutum* Laws.]

Sierra Leone. *Afzelius* s.n. [iso-typus *C. afzelii* Engl. et Diels in Hb. Brit. Mus.] ; *Vogel* 47 (fls. Jun. 1841) [typus in Hb. Kew.] ; Senge, between Gbangbama and Gbangbatok, *Deighton* 2369 (fls. Nov. 1931) ; Njala, *Deighton* 3096 (fls. Nov. 1935), 3445 (same plant as 3096, fls. Nov. 1937), 3539 (same plant as 3096 and 3445, frts. Apr. 1938) ;

Gold Coast. River Tano, *Chipp* 343 (fls. Sept. 1912).

Nigeria. Lagos, Iddo Island, *Millen* 7 (fls. Oct. 1891) [co-typus *C. afzelii* Engl. et Diels in Hb. Kew.].

Fernando Po. *Mann* 410 (fls. Jun. 1860).

Also recorded from the French Cameroons (*Buchholz* s.n., iso-type of *C. conchipetalum* Engl. et Diels in Kew Herb. ; *Zenker* 2686) and from the Belgian Congo (*Vermoesen* 1328 ; *Lebrun* 883 ; *Vanderyst* 4148 type of *C. calvescens* Exell in Brit. Mus. Herb.)

The excellent specimens collected in Sierra Leone from a single plant by Mr. F. C. Deighton show a range of variation which covers four species which have been regarded as distinct. The inflorescence (especially in young spikes) in some of Deighton's specimens is clothed with a rusty pubescence approximating very closely to that of *Vogel* 47 (type of *C. cuspidatum* Planch. ex Benth.) and *Vanderyst* 4148 (type of *C. calvescens* Exell) ; in others the indumentum is relatively sparse and the specimens are not to be distinguished from the type of *C. afzelii* Engl. & Diels and *C. conchipetalum* Engl. & Diels, two species which have already been united by Exell (l.c.). The shape of the leaves varies considerably even on a single plant. In well developed leaves there is a distinct cusp but in many the apex is malformed and may be rounded or emarginate. The texture and appearance of the leaves, as described in the above key, are very characteristic and constant.

Roberty (l.c.) regards this species in its various states as *formae* of *C. smeathmannii* G. Don (=C. mucronatum *Schumach. et Thonn.*), but this is entirely unjustified. Quite apart from the flowers and leaves, there is a remarkable difference in fruits ; in *C. smeathmannii* the fruit is about

1·3 cm. long, more or less orbicular, with delicate pale fawn papery wings, whereas in *C. cuspidatum* the fruit is about 4·5 cm. long, ovate with a long beak, dark brown tough, and with thick narrow wings.

Sect. Fuscae Engl. et Diels

This section will be dealt with in a later contribution, only the new species already mentioned in the conspectus being described now :—

Combretum fulvum *Keay*, sp. nov. ; a *C. batesii* Exell ramulis et omnibus partibus inflorescentiae ferrugineo-lepidotis, staminibus biserialibus, stylo apicem versus haud incrassato, foliis oblongis vel oblongo-obovatis subtus impresso-lepidotis, distincta.

Frutex scandens. *Ramuli* juveniles ferrugineo-lepidoti. *Folia* opposita, petiolata, petiolo sparse puberulo et ferrugineo-lepidoto 5–8 mm. longo ; lamina oblonga vel oblongo-obovata, basi rotundata vel anguste cordata, apice acuminata vel aliquando rotundato-apiculata, 8–17 cm. longa, 3·5–7·5 cm. lata, plus minusve coriacea, supra nitidula glabra, subtus minutissime impresso-lepidota, margine integra leviter undulata ; costa supra impressa, subtus prominens ; nervi laterales 7–14 utrinque prominuli, sub marginem arcuatim anastomosantes ; rete venularum utrinque satis obvium. *Flores* tetrameri in spicas glomeruliformes paniculatas dispositi ; spicae 1–2·5 cm. longae, pedunculis 1–1·5 cm. longis ferrugineo-ledidotis. *Receptaculum inferius* 2–2·5 mm. longum, dense ferrugineo-ledidotum ; *superius* elongato-infundibuliforme, 3·5 mm. longum, 2 mm. latum, extus ferrugineo-lepidotum, intus sparse puberulum ; discus inconspicus, omnino adnatus ; segmenta calycis late triangularia, usque 0·6 mm. longa, more receptaculi superioris vestita. *Petala* alba, demum flavescentia, glabra, oblanceolata, circiter 2 mm. longa, 0·7 mm. lata. *Stamina* biserialia, exserta, filamentis circiter 5 mm. longis ; antherae late ellipticae, circiter 0·6 mm. longae. *Stylus* glaber, exsertus, circiter 5 mm. longus, apicem versus haud incrassatus. *Fructus* quadrialatus, orbicularis, 3–4 cm. diametro, basi cordatus, apice emarginatus, alis quam corpus duplo latioribus chartaceis pallide brunneis sparse ferrugineo-lepidotis, corpore dense ferrugineo-lepidoto.

Sierra Leone. Njala, 10 Oct. 1928, *Deighton* 1332 (Hb. Kew., typus ; Hb. Brit. Mus.) :—straggling bush ; white flowers, turning yellow. Mano, Taiya River, 22 Jan. 1927, *Dalziel* 8097 (Hb. Kew., type of fruits) :—woody climber on bank of river.

This species seems best placed in §*Fuscae* Engl. & Diels despite the fact that the style is not thickened at the apex. Exell (Journ. Bot. **67,** 145, 1928), in describing *C. sordidum* and *C. batesii*, has already pointed out that the thickening of the style is of doubtful value as a sectional character. If the style character is regarded as important than *C. fulvum* would come into §*Chionanthoideae* Engl. & Diels, and in some respects it does resemble species of this section, especially *C. butyrosum* (Bertol. f.) Tul. The fruit of the new species is however of the normal winged type which appears to be general in §*Fuscae* ; most species of §*Chionanthoideae* having bulky fruits, ridged but scarcely winged.

I must thank Mr. A. W. Exell, who had provisionally annotated Deighton's specimen at Kew as a new species, for generously placing it at my disposal.

THE SYSTEMATIC POSITION OF SUFFRUTESCENT SPECIES OF COMBRETUM LOEFFL.

R. W. J. Keay

In their monograph on the African species of *Combretum*, Engler and Diels recognised six suffrutescent species. One of these, *C. argyrotrichum* Welw. ex. Laws., was placed in §*Ciliatipetalae*, but the others were brought together naturally into §*Parvulae*, a section differing from the forest shrubs and lianes of §*Conniventes* mainly in the suffrutescent habit. The five species of §*Parvulae* as first understood by Engler and Diels were :— *C. sericeum* G. Don (=*C. herbaceum* G. Don, first reduced to synonymy by Bentham in Hooker's Flora Nigritiana, 341: 1849), *C. parvulum* Engl. et Diels, *C. platypetalum* Welw. ex Laws., *C. oatesii* Rolfe and *C. turbinatum* F. Hoffm. Engler and Diels also mentioned the Asiatic suffrutex *C. nanum* Ham. and placed it in their §*Ovalifoliae* because of its obvious affinities with the scandent shrubs and lianes of this section. It will be seen therefore that Engler and Diels recognised suffrutescent species in three distinct sections of the genus. There has however been a tendency among subsequent botanists to compare all suffrutescent species with §*Parvulae*, irrespective of floral structure.

C. viscosum Exell was placed by its author in §*Parvulae*, but its closest affinity, as Mr. Exell himself lately suggested, appears to be the tree *C. apiculatum* Sond. of §*Ciliatipetalae*.

C. harmsianum Diels was described without flowers and was placed by its author in §*Parvulae*, but Exell (1936) in identifying flowering specimens rightly transferred it to §*Glabripetalae* on account of floral structure.

C. bauchiense Hutch. et Dalz. was compared by its authors with *C. sericeum* G. Don (=*C. herbaceum*) which it resembles in habit. The two species are however widely separated as regards floral structure, *C. bauchiense* coming naturally into §*Glabripetalae*. Within the *Glabripetalae* the closest affinity of this species appears to be, moreover, not with the suffrutescent *C. harmsianum*, but with trees of the *C. ghasalense* Engl. et Diels alliance.

C. relictum Hutch. et Dalz. was not originally recognised as a suffrutex. Aubréville (1944) has, however, shown that the type-specimen (*Heudelot* 747), as indicated by the collector's notes, as well as subsequently by specimens from the same region, is in fact suffrutescent. The closest affinity of this species appears to be with the tree *C. glutinosum* Perr. ex DC. in §*Glabripetalae*. Aubréville considers it to be a variety of *C. glutinosum*.

It appears therefore that the suffrutescent habit has arisen in at least three sections of the genus in addition to §*Parvulae*, and the natural relationships of these suffrutices are most clearly seen by placing them in sections according to their floral structure rather than in a single section on account of life form. The suffrutescent habit alone cannot, it seems, be regarded as a character of sectional importance, and the validity of Engler and Diels' §*Parvulae* must be called in question. The differences in floral structure between sufrutices of the *C. sericeum* and *C. platypetalum*

alliances and the lianes and shrubs of §*Conniventes* are very minor and, in my opinion, not of sectional importance. A further reason for including these suffrutices in §*Conniventes* is that plants of the *C. sericeum* complex have recently been found in Nigeria intermediate in life-form between suffrutices and scandent shrubs.

The suffrutescent species of *Combretum* should therefore be placed in sections as follows :—

§**Ciliatipetalae** Engl. et Diels

Predominantly a section of savanna trees in tropical Africa.

Suffrutices :— *C. argyrotrichum* Welw. ex Laws. in Oliv. Flor. Trop. Afr. **2,** 432 (1871)

C. viscosum Exell in Journ. Bot. **66,** Suppl. 1, 171 (1928)

§**Glabripetalae** Engl. et Diels

Predominantly a section of savanna trees in tropical Africa.

Suffrutices :— *C. harmsianum* Diels in Engl. Bot. Jahrb. **39,** 505 (1907)

C. bauchiense Hutch. et Dalz. in Flor. W. Trop. Afr. **1,** 216, 220 (1927), et in Kew Bull. **1928,** 224 (1928)

C. relictum Hutch. et Dalz. in Flor. W. Trop. Afr. **1,** 218, 221 (1927), et in Kew Bull. **1928,** 225 (1928)
C. glutinosum Perr. ex DC. var. *relictum* (Hutch. te Dalz.) Aubréville in Combret. des Savanes Boisées de l'A.O.F., 23 (1944)

§**Ovalifoliae** Engl. et Diels

Predominantly a section of scandent shrubs and lianes in tropical Asia.

Suffrutex :— *C. nanum* Ham. ex D. Don, Prodr. Fl. Nep. 219 (1825)

§**Conniventes** Engl. et Diels (incl. §*Parvulae* Engl. et Diels)

Predominantly a section of scandent shrubs and lianes in tropical Africa.

Suffrutices :— *C. sericeum* G. Don in Edin. Phil. Journ. **9,** 347 (1824)

C. platypetalum Welw. ex Laws. in Oliv. Flor. Trop. Afr. **2,** 433 (1871)

Closely allied to the above and possibly conspecific with one or other of them are the following :—

C. oatesii Rolfe in Oates, Matabele Land, ed. **2,** 399 (1899)

C. turbinatum F. Hoffm. Beitr. Fl. Centr. Ost. Afr., 28 (1899)

C. parvulum Engl. et Diels, Monogr. Afr. Pflz. **3,** 67 (1899)

C. arenarium Engl. et Gilg in Warb. Kunene-Sambesi Exped. 318 (1903)

C. argyrochryseum Engl. et Gilg, l.c. 320 (1903)

C. baumii Engl. et Gilg, l.c. 320 (1903)

C. gnidioides Engl. et Gilg, l.c. 319 (1903)

C. katangense De Wild. in Fedde Repert. **9,** 516 (1913)

C. stenophyllum R. E. Fries in Wiss. Ergebn. Schwed. Rhod.-Kongo Exped. 1911–12, **1,** 170 (1914)

C. wittei Exell, in Rev. Zool. Bot. Afr. **21,** 89 (1930)

We are concerned here only with the systematic position of the suffrutescent species ; the problems of their biology and evolution require further research. It is however interesting to note that the suffrutescent habit has evidently arisen in four sections of the genus, two of these sections consisting predominantly of savanna trees, and two predominantly of forest shrubs and lianes.

References.

Aubréville, A. (1944) *Les Combretum des Savanes Boisées de l'Afrique Occidentale Française*, Paris.

Engler, A. & Diels, L. (1899) Monographieen afrikanischer Pflanzen-Familien und Gattungen **3,** *Combretaceae-Combretum.*

Le Testu, G. & Exell, A. W. (1936) Les espèces de *Combretum* de l'Afrique Occidentale tropicale dans l'herbier de M. Le Testu, *Bull. Soc. Linn. de Normandie*, sér. 8, **9,** 117–144.

Linum*.—The importance of this genus, as the botanical source of flax and linseed (*Linum usitatissimum*) and of various garden or ornamental plants, needs no emphasis. With the world shortage of many vegetable fibres and oils increased attention has been paid to both flax and linseed in many parts of the world, including the British Isles. In Britain the use of improved varieties of linseed and of a better understanding of the cultural requirements of the crop under British conditions, especially the need for clean or weed-free land, has greatly increased the average yield with this crop. It is therefore fitting to record the appearance of a work by Prof. Ciferri of Bologna devoted to the genus *Linum.*

The first pages deal with the family *Linaceae* as a whole and its geographical distribution, the latter being depicted by a series of maps. There are also sections on anatomy, with special reference to fibre structure, on genetics and chromosome numbers in the genus *Linum*, and on the antiquity of flax and linseed in the Mediterranean region. The more important species of *Linum* are dealt with at some length with line drawings to illustrate the habit and other characters. A useful bibliography of some 250 entries accompanies the work.

F. N. Howes.

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*La Sistematica del Lino. By Prof. R. Ciferri. Pp. 203+Fig. 89. Bologna : Anonima Arti Grafiche, Piazza Calderini, 4 : 1949.

A NEW EULALIA FROM BURMA.

N. L. Bor.

Eulalia bicornuta *Bor*, sp. nov., *E. pallenti* O. Ktze. affinis sed ab ea gluma spiculae sessilis inferiore bimucronulata, spiculis rhachidibusque minus pilosis differt.

Gramen perenne, caespitosum. *Culmi* usque 100 cm. alti, graciles, teretes, glabri laevesque, striatuli. *Foliorum laminae* lineari-acuminatae, usque 20 cm. longae, 2·5 mm. latae, apice setaceae, planae vel plerumque involutae, subtus laeves glabraeque, supra tomento denso albo tectae ; *vaginae* arctae, culmos complectentes, laeves glabraeque, striatulae, inferiores coriaceae, emortuae et a culmo demum in fibras solutae, superiores laminas brevissimas vel rudimentarias gerentes ; *ligula* membranacea, angustissima.

Racemi 2–3, usque 10 cm. longi ; pedunculus brevis, glaber, laevis, breviter exsertus ; rhachis fragilis ; articuli 3 mm. longi, superne clavati, articulatione obliqua, sectione triangulares, angulis ciliati ; pedicelli 2·25 mm. longi, marginibus duobus pilis superne usque 1·5 mm. longis inferne pilis brevioribus ciliati ; spiculae sessiles et pedicellatae similes, aureo-brunneae, aristatae, 3·5–4 mm. longae. *Spicula sessilis* ; *gluma inferior* elliptico-oblonga, 2-nervis, bicarinata (carinarum nervis in dentes duos curvatos productis), dorso laevis, inter carinas depressa, dorsi media parte longe hirsuta, superne inferneque glabra ; *gluma superior* ambitu lanceolato-oblonga, navicularis, apice truncata, 3-nervis, carina glabra, lateribus inferne hirsuta, ceterum glabra, laevis, apice vel infra apicem breviter aristata ; arista 2–3 mm. longa. *Anthoecium inferius* vacuum ; *lemma* hyalinum, 2·5 mm. longum, oblanceolatum, *palea* brevissima, oblonga, hyalina. *Anthoecium superius* ♀ ; *lemma* oblongum, 2·5 mm. longum, angustissimum, 1-nerve, apice fissum, inter lobos acutos aristam 7–9 mm. longam inferne tortam auream emittens ; *palea* apice truncata, lata, ovato-elliptica, hyalina, 1·5 mm. longa, 1·5 mm. lata ; *stamina* tria, purpurea ; *antherae* 2·25 mm. longae ; *styli* 2 ; *stigmata* plumosa, purpurea ; *lodiculae* 2, cuneatae, parvae, 3-dentatae. *Spiculae pedicellatae* spiculis sessilibus similes sed gluma inferiore hirsutiore paullo recedit.

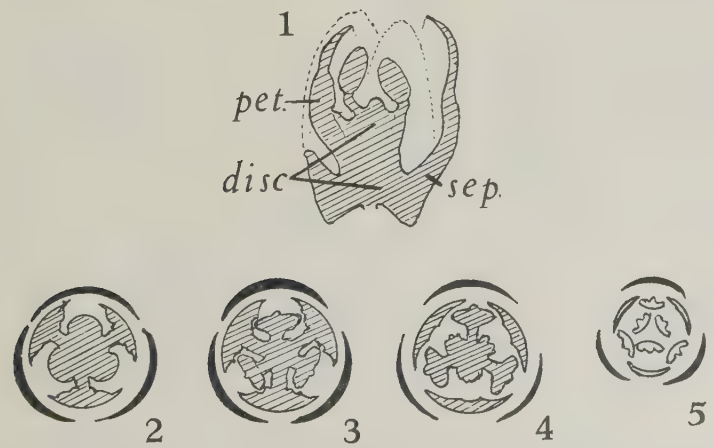
Burma. Kaukkwe Valley, Nansonli Reserve, Myitkyina District, 130 m., 22 Nov. 1912, *J. H. Lace* 6051. " This together with No. 6052 covers a great deal of the open spaces in a poor sort of indaing composed chiefly of Quercus ? mespilifolia, ingyin, Tristania burmanica, Buchanania, Terminalia tomentosa, Wendlandia etc." Lace's No. 6050 also from the same area is *Eulalia trispicata* (Schult.) Henr. which *E. bicornuta* resembles superficially to a remarkable degree. In fact to separate the two the 2-horned lower glume and the awned upper glume of *E. bicornuta* must be made out, but the two grasses resemble one another so closely as to suggest that the latter species is probably far more common than collections would lead one to think. (Typus in Herb. Kew.).

A NEW DIOSCOREA FROM THE CELEBES.

I. H. Burkill.

Dioscorea (**Enantiophyllum**) **sexrimata** *Burkill* sp. nov. ; propter conjunctiones inter torum tumidum et latera interiora petalorum filamentorumque singularis, nisi *D. sarasinii* Ulinei similis sit his partibus. *D. sexrimata* differt a *D. sarasinii* dispositione spicarum fertilium masculinarum quae in ramos aphyllos ad 16 cm. longos collocatae sunt, quando quidem contra spicae masculinae omnes *D. sarasinii* in fasciculis amplis ad axillas foliorum coactae sunt.

Partes inferiores ignotae. *Planta* glabra. *Caulis* tenax, ad 2 mm. crassus, fere laevis. *Folia* inferiora opposita, remotiora alterna : lamina subcoriacea, lanceolata, etiam in foliis plerisque late lanceolata, basi saepe accurate rotundata vel latissime obtusa, ad 12 cm. longa, ad 3 cm. lata, 5-nervis, nervis extremis submarginalibus, nervis omnibus infra distinctis, margine leviter indurata : petioli longitudo quartam partem laminae aequans vel brevior. *Rami masculini* fertiles ex axillis foliorum supremorum singuli, folia parum excedentes vel foliis breviores, sat laxi internodiis 10–30 mm. longis. *Alabastra* paullulo elongata, basi more sellae equestris ad axin appressa. *Torus* floris latus, ambitusu btriangularis, sepala suppeditans margine, centro conico-tumidus et sex-radiatus ob fulcra tria in partibus inferioribus petalorum et tria adjuncta in partibus inferioribus filamentorum ante-sepalorum infixa, qua auxilio petalorum staminumque sex celliculas limitant (vide fig. 3). *Petala* ut plurimum incrassata, sed margine tenuia, facie interiori bilineata. *Stamina* biserialia ; stamina ante-petala os floris fere attingentia ; stamina ante-sepala paullulo deficientia : filamenta antheris aequilonga vel brevia. *Gynoecium* sine conformatione pertinente. *Flos foemineus* ignotus.



Dioscrea sexrimata Burkill. A vertical section through a flower showing the swollen disc which makes a saddle over the axis, and extends upwards with the petals and ante-sepaline filaments adnate ; and transverse sections at four different horizons. In the second of these the six channels between the petals and ante-sepaline filaments are seen, virtually closed ; and it may be that they are ways by which honey at the base of the flower can be reached by visiting insects.

Capsularum delapsarum valvae ad 22 mm. longae ; alae ad 18 mm. latae ; apex quodam modo retusus ; basis in stipam 6–7 longam extensa. *Semina* non visa.

Celebes. Liasa, ad 300 m. alt., inter arbusculas consociatas, *Kjellberg* 2262 ♂ ; Kendari septentrionalis, ad 300 m. alt in sylvis pluviosis, *Kjellberg* 671 ♀. Floret in mense Septembri. Typi in herbario Horti Botanici ad Bogor conservati.

The cousins Paul and Fritz Sarasin collected *D. sarasini* Uline in the northern limb of Celebes ; *D. sexrimata* was collected in the south-eastern limb. *D. sarasinii* was described (R. Knuth, Dioscoreaceae, p. 291 : 1924)—as having the inner stamens connate to the gynoecium : but it may be that actually the structure of the flower resembles more closely that of *D. sexrimata* than Dr. Knuth's description suggests. Further studies must be awaited. The two species differ in the arrangement of the male flower-spikes, *D. sarasinii* having them in large fascicles in the axils of leaves ; *D. sexrimata* having them spread over an elongated more or less leafless branch or stem end. The first named was figured by Dr. Knuth and figured again rather more accurately in the Annals of the Royal Botanic Garden, Calcutta (XIV, pl. 109).

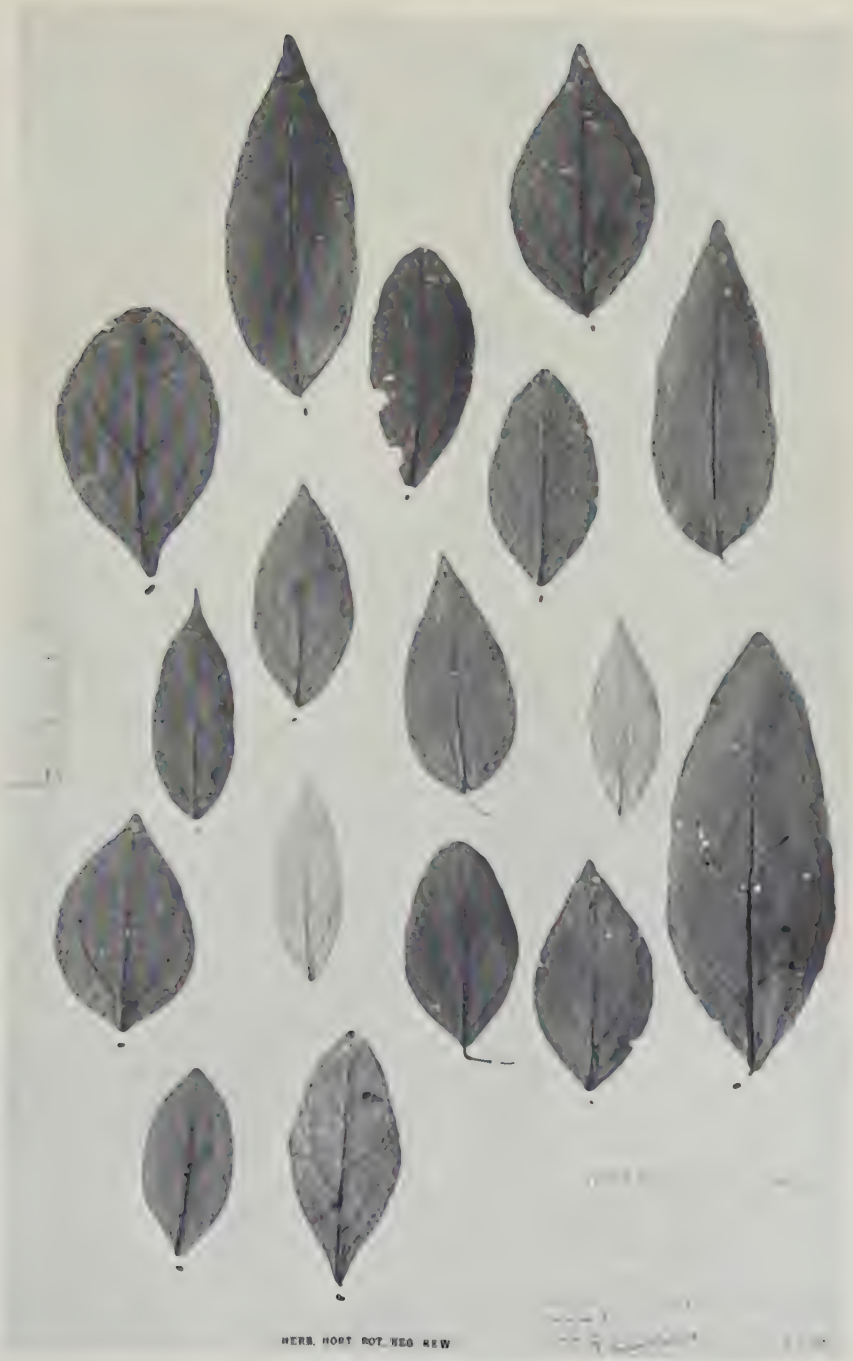
The structure of the flower is difficult to comprehend without the use of the diagrams given here. The torus grows upwards, much as in a Rubus, but lifts the petals and stamens ; and in its growth it enlarges their insertion by retaining a bridge of tissue to the inner face of the petals and the inner face of the ante-sepaline stamens ; and between the six radial walls that may be seen at the appropriate horizon are six channels with a narrow or obliterated chink opening outwards.

In the section Enantiophyllum it is not unusual for the base of the flower to consist of tissue which appears to be a small water reservoir used to equalise turgidity during anthesis. But in no species but these here named, is it extended upwards with the appearance of adnation between petals, stamens and gynoecium.

MR. C. T. WHITE

It was with great regret that we learnt of the death of Mr. C. T. White, the distinguished Government Botanist of Queensland, on August 16th. He was always a welcome visitor at Kew, and had expected to visit us again in 1951. An obituary notice will appear in our next number.

Plate 3



Capparis erythrocarpa Isert

Plate 9.

Triclisia subcordata Oliv.

Plate 10.

Fagara xanthoxyloides Lam.

VARIATION IN LEAF-SHAPE WITHIN A SPECIES: SOME EXAMPLES FROM THE GOLD COAST

Whilst at Achimota College in the Gold Coast in 1941, I was enabled to become familiar with the constituent species of shrubs forming the evergreen thickets of the dry coastal belt, and I was much struck by the high degree of variation in leaf shape and size that was to be found within a species, or even on different parts of a single individual plant.

A selection of leaves from a single individual bush of each of three unrelated species are shown on the accompanying plates. Plate 8 shows leaves from a bush of *Capparis erythrocarpa* Isert (*Capparidaceae*) with shapes varying from obovate, through elliptic to ovate and lanceolate, with apices varying from sharply acuminate to obtuse, and bases from cuneate to rounded. Even the venation varies considerably in the degree of development of the upper primary lateral nerves. In some cases, where these are largely suppressed, the leaf has a three-nerved appearance reminiscent of *Strychnos*.

Plate 9 shows a series gathered from an individual plant of *Triclisia subcordata* Oliv. (*Menispermaceae*). Here again both the general shape as well as the shapes of the apex and the base show enormous variation, considerably greater than the differences given to separate *T. dielsii* Hutch. & Dalz. from *T. subcordata* in the Flora of West Tropical Africa (**1,** 72 : 1927). As there are no obvious floral differences to separate these two species and as the only known locality for *T. dielsii* comes well within the range of *T. subcordata* and both inhabit similar country, I have no hesitation of reducing *T. dielsii* to the synonymy of *T. subcordata*.

My third example, shown on Plate 10, is *Fagara xanthoxyloides* Lam. (*Rutaceae*), a species normally with pinnate leaves, but which not infrequently produces simple leaves or leaf with a reduced number of leaflets. The simple, bi- or trifoliolate leaves here depicted would exclude the plant from *Fagara* in Hutchinson and Dalziel's key (l.c. 479 : 1928).

These examples, I think, demonstrate a very important point. Floras are prepared in herbaria and are based largely on herbarium specimens of the plants included therein. The field worker expects to find in a Flora some information as to the extent to which a species may be expected to vary. This information cannot be put into the Flora unless the collectors have supplied the botanist concerned with writing the Flora with the necessary information. It is therefore up to the collector to collect species so as to show the degree of variation, either within an individual bush or tree, or within a population. If collecting on these lines could be attempted, the resulting information would help to make future Floras more reliable and correspondingly more useful in the field.

E. Milne-Redhead

Flowers to know and grow*.—During 1949 the Castle Press published four little booklets on flowers of the seasons by Audrey Wynne Hatfield (see Kew Bulletin 1950, no. 1, p. 127). These little booklets were so well received that the publishers decided to bring them together under

one cover. The result is a pleasing and interesting volume which amply justifies this decision. The opening chapters, which contain useful information on soils, propagation, planting, and history, are followed by an index and a list of flowering seasons. Each page of the book proper is headed by a delightful flower drawing, executed by the author, accompanied by a description and details of scent, varieties history and culture.

H. S. MARSHALL.

*Flowers to know and grow. By Audrey Wynne Hatfield. London : Castle Press. 1950. Pp. 174. Price 12/6.

Commercial Glasshouse Crops*.—The author, who is Director of the Experimental and Research Station, Cheshunt, situated in the centre of a large market gardening district, has devoted many years to the problems of the Glasshouse Industry and his book on the commercial cultivation of crops under glass will be welcomed by all those interested in the subject.

In his preface Dr. Bewley states that the book came to be written as a result of the insistence of his grower friends, who seemed to think he could produce something of interest that would prove useful to the Glasshouse Industry as a whole. In this book he has fully justified their confidence and the practical instruction on the management and culture of glasshouse crops should prove helpful not only to the experienced grower but also to the amateur.

The book opens with a chapter on planning and building a nursery, and deals with the many important points such as district, site, soil types, water supply, distance from rail-head, the construction of glass houses and methods of heating. This is followed by some forty-two pages on the soil, in which the subject is thoroughly dealt with and attention paid to such matters as the physical and chemical aspects, the effect of nitrogen, phosphate, potassium and other elements upon the plant, air and water in the soil, fertilizers, plant nurseries and soil warming.

Chapters on commercial glasshouse crops include tomatoes, cucurbits and vegetables, fruit crops, cut flowers, bulbs and pot plants. Not only are exhaustive cultural details given but also interesting notes on the history and the best varieties to grow. The important question of diseases, pests, and their control, is dealt with in a very able manner. Methods of control such as protection against the introduction of infected material, the elimination of infection centres, the use of resistant varieties, adjustment of the environment, sterilization of the soil, disinfection of the glasshouses, fungicides and insecticides, are carefully described and much useful information supplied. The concluding chapters are devoted to an historical survey of the industry and the recent applications of science to glasshouse crops.

A feature of the work is the number of excellent reproductions of photographs, many of which, illustrating the various operations in cultural methods, will be found extremely useful. The book which is well produced is provided with a useful index.

H. S. MARSHALL.

*Commercial Glasshouse Crops. By W. F. Bewley. London : Country Life Limited. 1950. Pp. xii. 509. Price 50/-.

A NEW MALVASTRUM FROM THE PERUVIAN COAST.

N. Y. Sandwith.

Among the many interesting plants collected in Peru by Mr. Christopher Sandeman is a very unusual and attractive species of *Malvaceae* which he found in the Lomas zone on the coast at Chala, between Lima and Mollendo. This plant is unmatched in the Kew material of this family, nor is it accounted for in the recent papers of Ulbrich, Johnston and other writers. Nothing like it is mentioned in Ferdinand Bruns' catalogue of the flora of the Peruvian coast, see Mitt. Inst. Allg. Bot. Hamburg, **8** (1929), nor in the lists of Weberbauer in his work, " El Mundo Vegetal de los Andes Peruanos " (1945). The description is as follows :

Malvastrum sandemanii *Sandwith*, sp. nov. ; nulla affinitate obvia, ob habitum, formam foliorum subsessilium, pedicellos longos graciles, absentiam bracteolarum, carpella glabra valde distincta.

Herba perennis ?, caulibus teretibus gracilibus ad 1·75 mm. diametro ad 30 cm. longis apice flexuosis dimidio vel triente inferiore nudis glabrescentibus superne copiose foliatis floriferisque et nonnunquam ex axillis foliorum breviter graciliter ramulosis purpurascentibus crebre sed satis sparse minute stellato-pubescentibus ; internodia 0·5–2·2 cm. longa ; stipulae filiformes, pilosulae, vix ad 1·5 mm. longae. *Folia* parva, subsessilia, petiolo ad 1 mm. longo, ambitu ovato hederiformi, scilicet prope vel paulo infra medium trilobata, tota 0·7–1·2 cm. longa, 0·5–1 cm. lata, lobo intermedio magno ovato acuminato lobis lateralibus multo minoribus deltoideis 1–2 mm. tantum longis, basi rotundata, supra griseoviridia subtus canescentia, utrinque stellato-tomentella, costa nervisque utroque ejus latere paucis 2–3 supra canaliculato-impressis subtus inconspicue elevatis. *Flores* secus totum caulem axillares, solitarii sed nonnunquam cum ramulo axillari brevi gracili inferne nudo apice foliifero floriferoque geminati ; pedicelli graciles, patuli, glabri, 2–3 cm. longi, 4–7 mm. infra apicem articulati, supra articulum sursum flexi. *Bracteolae* desunt. *Calyx* cupulari-campanulatus, extra satis dense stellato-tomentellus ; tubus 3 mm. longus, circiter 7 mm. latus ; lobi deltoideo-ovati, acuminati acutique, 3·2–3·5 mm. longi atque lati, marginibus subpurpurascentibus, intus secus margines atque dimidio superiore stellato-tomentelli. *Petala* roseo-lilacina, lamina late suborbiculari-obovata apice subtruncata sed latissime emarginata 1–1·1 cm. longa 0·9–1 cm. lata, ungue circiter 1·5 mm. longo longe molliter simpliciter piloso. *Staminum* columna 3 mm. longa, basi tantum zona pilorum mollium simplicium praedita ceterum glabra ; capitulum antherarum 4 mm. diametro. *Styli* columna 2–2·5 mm. longa, glabra ; rami 14–15, 2·5–3 mm. longi, apice capitato-stigmatosi. *Carpella* tot quot styli rami, glabra, laevia vel juventute dorso obscure transverse rugosula, exappendiculata, exaristata, uniovulata ovulo ascendente. *Fructus* non visus.

Peru. Dept. Arequipa : Chala region, growing in full exposure in small patches by the roadside in almost desert country at 1500 ft., April 1943, *C. Sandeman* 4020 (type in Kew Herb.) ; herb with pinkish lilac flowers and alternate grey-green leaves.

There is no fruit with the material, which must be referred for the present to *Malvastrum* on account of the position of the single ovule in each carpel. Nevertheless, the doubtful validity of this character as a means of distinguishing this genus from *Sida* has recently been exposed by Svenson, in Amer. Journ. Bot. **33,** 466 (1946). In habit and facies this interesting new plant of the Lomas formation suggests species of *Sida*, or even species of *Anoda*, rather than those of *Malvastrum*, but I have found no description agreeing with it.

American Wild Flowers.*—This book is the first of a series entitled " The New Illustrated Naturalist ", which is planned to cover all the main branches of the natural history of North America. If we are to judge from the present volume, this series will be very different in its aim and standards from our own " New Naturalist ". " American Wild Flowers " is frankly designed as a popularly written and copiously illustrated book for the nature-lover who can " go places " in his car, and describes the showiest and most interesting herbaceous plants occurring wild in the United States, Canada, Newfoundland, St. Pierre and Miquelon, Alaska and Greenland. The author sent a questionnaire to 1100 naturalists scattered all over this area, asking them to list the 12 most showy, conspicuous and interesting wild flowers of their neighbourhood. In this way, more than 1000 different plants were nominated for treatment (*Lobelia cardinalis* easily headed this continent-wide poll) and, after carefully selected additions by the author, 2050 species, varieties and named forms were chosen for description while many others received incidental mention. The plants are dealt with by families, in the order of Hutchinson's system : many chapters are devoted to a single family, while the *Carduaceae* need no less than four, whereas the sedges and grasses are relegated to the chapter beginning with the *Agavaceae* and *Dracaenaceae*. Carnivorous plants and epiphytes each have a special chapter. The book concludes with a very short illustrated glossary, a useful list of terms used for describing pubescence, and a selected bibliography. As usual, the black and white photographs are much more successful than the colour illustrations.

The author writes simply and directly, but with enthusiasm. He not only discusses the botanical characters, habitat and distribution of his chosen flowers but also conveys a great deal of useful general information about the families and genera, methods of pollination, folk-lore, etc. One can imagine no better beginning for the English amateur flower-lover who is planning to visit North America, while botanists at home, particularly those who study our adventive flora, will find it a fascinating bedside book. They will look in vain for any mention of *Amaranthus* and *Ambrosia* (which troubled our evacuee children with hay-fever), but will be surprised when they read of the remarkable spread of certain immigrants from Europe such as *Hibiscus trionum* and *Abutilon theophrasti*, or of the abundance as a native of the familiar *Caltha palustris*. What a relief it is to have a book of this kind written by a professional botanist who loves his local flora, and to know that one's enjoyment will not be derived from the spotting of howlers and misprints ! The author is on less sure ground when his mind takes flight across the Atlantic : *Galinsoga parviflora*

(not *G. ciliata*) was called " Gallant Soldier " here several decades before the London Blitz, nor did the " harassed Britishers " take any particular notice of the appearance of this genus in the ruins of their capital.

The outstanding feature of this book is the names of the flowers, especially the common names, with which almost every page is studded. The author obviously likes them, and they will give equal pleasure to those many people at all brow-levels who are susceptible to the charm or comedy of common names. The spelling is in accordance with the latest edition of *Standardised Plant Names*, issued by the American Joint Committee on Horticultural Nomenclature. The application of rules for spelling compound names produces sights and sounds amusing to English eyes and ears : thus we have " waterarum ", " cattail ", " clamshell-orchid " and " Jerusalemartichoke ", and such engaging oddities as " fiddlerstrumpet " and " low-bachelorsbutton ". " Oxslips " is not a slip, and " midasears " will probably have to be explained to the present generation. English readers will recognize " anemony " and " lupine ", but who would know that Chapter 38, headed " Paintbrushes, Beard-tongues, Turtleheads, and Little Elephants ", was devoted to *Scrophulariaceae* ?

As for the Latin names, a serious protest is called for against the author's minute generic splitting, especially in a book of this kind. He seems to enjoy maintaining or reviving names almost universally neglected for some of the commonest and best-known plants. This practice he defends in his introduction with the remark that, " No one can say that one point of view is right and the other wrong. Both are absolutely essential for a balanced and thorough understanding of nature in its infinite complexity ". Yet Sir William Wright Smith has recently reminded us that, " It may well be that a genus can be divided, but that is not in itself a reason for its division. Many things are divisible, but it is not always expedient or proper to divide them (when it is not necessary to make a change, it is necessary *not* to make a change)." It is good to stress that living organisms are dynamic and do not fit easily into man-made categories, but it is dangerous to suggest to beginners in any school that they will acquire a balanced view by believing that every judgment may be equally right where opinion is not unanimous. And what possible good can come of training them to associate London Rocket, Bindweed, Spanish Moss and *Hibiscus trionum* with such names as *Norta irio*, *Strophocaulos arvensis*, *Dendropogon usneoides* and *Trionum annuum* ? In such company *Draba verna* looks oddly old-fashioned. Besides, there are the International Rules, and the author has no " right " to continue the use of the rejected name *Parosela*, while everyone should deplore the discovery of *Campe* as a substitute for *Barbarea*. Let us hope that Dr. Moldenke will write further books for amateurs in which he will turn his back on generic splitting and will also lay more emphasis on the very frequent and significant unanimity among botanists over such matters as the size of genera and the rank of plants.

N. Y. Sandwith.

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*American Wild Flowers. By Harold N. Moldenke, Ph. D. Macmillan & Co., Ltd., London ; D. Van Nostrand Company Inc., New York, 1949, pp. 453, pl. 32 four-colour and xxxii gravure. Price 35s., $7.

KOENIGIA ISLANDICA IN BRITAIN.

B. L. Burtt.

Koenigia islandica L., a small annual member of the family *Polygonaceae*, was collected by Mr. H. M. Montford and Dr. Montford (Dr. Nellie Carter) at 2300 ft. near the summit of The Storr on the isle of Skye on 31st August 1934. It was casually labelled *Peplis* and was laid into that genus in the Kew herbarium. There it had been hidden till a short while ago when a chance examination of the *Peplis* material brought it to light. This appears to be the first record of the species from Britain and its most southerly station in Europe.

In general terms *Koenigia islandica* may be said to have a circumboreal distribution, though it reaches as far south as the Himalayas in central Asia. There is a very closely allied form, which may be conspecific, in the Southern hemisphere on Tierra del Fuego (*K. fuegiana* Dusen). For a more detailed statement of its range I cannot do better than quote from Dr. E. Hultén, Flora of the Aleutian Islands (p. 154 : 1937) :—

" Europe : from Jan Mayen, Spitzbergen and Nova Zembla southwards to Iceland, Faeroe Islands, central Scandinavia and arctic Russia. Asia : along the Arctic Coast to Chukch Penins, and southwards to Jakutsk. distr., the northern Kuriles (Onekotan) and Commander Is. Also in the central Asiatic mts. southwards to Tibet, Kashmir and Szech'uan. N. Amer. : N. Alaska (Kotzebue Sd) to Baffin Land and Labrador southwards to the Pribilof Is., the eastern Aleutians, S.E. Alaska and Alberta (Smoky R. acc. to Macoun), E. & W. Greenland, S. Amer. : Tierra del Fuego."

Clearly the station in Skye can be regarded as a not improbable outlier of that part of the range which includes Iceland, the Faeroes and central Scandinavia.

The habitats favoured by this species are damp rocks and mud and stream-banks. Mr. Montford writes : " The other plants I collected from the locality were *Juncus biglumis*, *Carex oederi* [i.e. *C. demissa* Hornem.] & *Cherleria sedoides*. There is not much bare rock on The Storr, but a good deal of bare peaty mud towards the summit. The " peak " is just the highest point on a long steep escarpment facing East. To the West is a gentle dip slope, *Scirpus caespitosus* bog, very wet." In Iceland it is reported on the banks of hot springs whose water is at 70° C. It is an interesting plant in that it has a more arctic distribution than perhaps any other annual.

*Koenigia islandica** is a small annual plant usually about 2–6 cm. high, though growing up to 15 cm. in some parts of its range. The lowest leaves are subopposite the intermediate ones alternate, the uppermost subopposite or clustered below the flowers. The lamina is obovate-oblanceolate, about 5 mm. long and 3 mm. broad, subsessile or with a very short petiole ; the stipular sheath (ochrea) is short. The flowers are small, fasciculate among the upper leaves, and shortly pedicellate. The perianth is deeply 3-lobed, the stamens 3 in number and the angled ovary develops to a typically polygonaceous trigonous nutlet.

*For illustrations see :—Fl. Danica, 3 : t. 418 (1768). Svensk Botanik, 8 : t. 513 (1819). Britton & Brown, Ill. Fl. Northern States & Canada, ed. 2, 1 : 647 (1913)—as *Macounastrum islandicum* (L.) Small. Stefansson, Fl. Islands, ed. 2, 89 (1924). Lindman, Bild. Nord. Fl. ed 2/3, Suppl. t. 640 (1926).

MARINE ALGAE FROM THE GOLD COAST I.

C. I. Dickinson and V. J. Foote.

This initial list of Marine algae from the Gold Coast is based on collections obtained by one of the authors (V. J. F.)during brief expeditions made at intervals since 1939.

While the whole coast-line was originally surveyed, actual investigations were confined to a region roughly 230 miles long lying between the Ancobra and Volta rivers, because further east and west of these rivers only sandy and relatively inaccessible beaches are found.

Most of the collecting grounds are sandy beaches with large surf-washed rocks partially exposed at low tide, or headlands with ledges and large protruding boulders, still washed by strong waves during low tides. Conditions are generally unfavourable for algal growth, and as most of such algae as are found occur on the vertical sea-washed faces of boulders, collecting is both difficult and dangerous.

As might be expected on this type of shore, the flora is an impoverished one. We hope, however, that with further study this present list may be extended, and become at least more complete than any which has yet appeared for neighbouring coastlines. This part of the tropics is algologically speaking practically unknown.

Prampram is the only beach which it was possible to work systematically during the war years. Other beaches were subsequently made more accessible by the building of motor roads, and were visited for the first time in 1948 and 1949.

At Prampram there is a steeply shelving sandy beach, dipping down to the rock covered surface of the intertidal zone. West of the Castle this zone flattens out to an almost level surface, with long interrupted masses of horizontal rocks lying roughly parallel to the foreshore. This area was selected for study, and mapped along a base-line of 700 ft.

The long parallel masses are isolated by sandy stretches, with occasional large isolated rocks.

In these sandy stretches the basal rock is never very far below the surface. The exposed rocks are always submerged at high tides. Three broad zones have been recognised proceeding from the lowest to the highest level, named Inner, Middle, and Outer Zones respectively.

In the early years of the War material was sent to the British Museum (Natural History), South Kensington, where Mr. A. Gepp and Miss L. Lyle worked on it and in spite of the then prevailing conditions succeeded in producing a provisional list of some 60 species. Most of this material was subsequently destroyed by enemy action before the identification could be confirmed.

One of us (V. J. F.) made the collection and wrote the field notes which accompany the systematic list. The other author (C. I. D.) is responsible for the determinations and drew up the systematic list.

Specimens are deposited in the Kew Herbarium.

Both of us are grateful to the Keeper of Botany, Natural History Museum, for kindly permitting the work to be transferred from his department to Kew. One of us (V. J. F.)is indebted to the Director and to the Keeper of the Herbarium of the Royal Botanic Gardens, Kew, for

permission to work in the Herbarium, to Professor Boughey of the University of the Gold Coast for advice and access to facilities and material, and to Professor T. M. Harris of Reading University for suggesting the investigation and for advice.

VALONIACEAE.

Struvea anastomosans (*Harv.*) *Piccone* in " Crociera del Corsaro alle Isole Madera e Canarie del Capitano Enrico d'Albertis 20 : 1884

Prampram Jan. '49, March '39, Oct. '41.

Light yellowish green bracket-like growths, crisp to the touch. In '39 one small patch was found on a Middle Zone rock. In '41 odd tufts had spread east of this rock in the same area but in '49, after the local inhabitants had removed the upstanding portions of the Inner Zone rocks, it came in very strongly all over the denuded bases of these, and similarly denuded rocks in the inner Middle Zone. In Nov. '49 it had disappeared from the Inner Zone, and only a few patches have been found on the outer Middle Zone rocks. It appears to do best in longitudinal crevices, on or near the tops of rocks where a certain amount of sand lodges, and on denuded surfaces where sand can lodge.

CAULERPACEAE

Caulerpa crassifolia (*Ag.*) *J. Ag.* Till Alg. Syst. I : 13 : 1872.

Winneba Feb. '49, Jan. '45. Prampram Jan. '49, Jan. '45, Nov. '48, Aug. '39, Apr. '41. Elmina Jan. '45, Apr. 45. Cape Coast Dec. '45.

Small grass-green patches of this alga occur frequently on wave-swept rocks in Outer and outer Middle Zones, and occasionally nearer in-shore on rocks in pools, where the larger breakers well in from time to time. In this last habitat they are occasionally in pure stands ; generally speaking they creep among a mixture of other algae, invariably on one corner of the edge of the rock on the exposed seaward face. Tends to turn yellowish-brown when pressed.

DICTYOTACEAE

Spatoglossum schroederi (*Mert*) *J. Ag.* Till Alg. Syst. V : 113 : 1872.

Prampram Jan. '46, March '49.

Dull olive-greenish brown fronds, about 6–9 ins. high. Growing on large rocks in the Middle Zone. Rather ragged in appearance.

Stypopodium zonale (*Lamour.*) *Papenfuss* in Botaniska Notiser 1940 : 205 : 1940.

Prampram March '49.

Found growing in Middle Zone in much the same manner as Spatoglossum which it resembles rather closely.

CHAETANGIACEAE

Galaxaura marginata (*Soland.*) *Lamour.* Hist. Polyp. Corall. flex. 264 : 1816.

Prampram Aug. '39, March '39. ♀.

Plants about 2–6 ins., average about 5 ins. Colour dull crimson, bright red at tips, shading to off-white or dirty yellow at the base. Sometimes the whole frond with the exception of the apices appears quite green,

the colour being due to the presence of an epiphyte. In November the fronds appear very old and denuded except for the apices, which are rather swollen, bright red and irregular, looking as if they were regenerating. Fairly common all over the Prampram area, but usually as solitary plants or 4–5 growing in one pool. Either in shallow pools of sand-covered rock, where they may be half buried in sand, or in deep pools between large rocks, on the lower sand-covered edges.

BONNEMAISONIACEAE

Asparagopsis taxiformis (*Delile*) *Coll. et Herv.* in Proc. Amer. Acad. Arts Sci. 53 : 117 : 1917.

Prampram Sept. '43.

First found thrown up on the beach in a heterogeneous collection of weed, mainly *Sargassum* at a spot between Prampram and Ningo which we have named Sponge Point, because so many are thrown up there. Later found growing on the mapped area at Prampram in large tufts scattered over the outer part of the Middle Zone on large rocks. Fronds delicately plumose in appearance, about 4–5 ins. long, yellowish red and succulent, the main stipes being yellowish, and the ultimate ramuli crimson. The plants washed up appeared duller read, and some of the main stipes brownish from exposure.

Falkenbergia hillebrandii (*Born.*) *Falkenb.* Rhodomelaceen 689 : 1901.

Prampram Jan. '49.

GRATELOUPIACEAE

Grateloupia gibbesii *Harv.* Nereis Bor-Amer. II : 199 : 1853.

Prampram Sept. '43 ♀. Dec. '45, ♀.

Plants rare, found growing attached by a small basal disc to rocks covered by sand, or in the case of the Anamabu specimens, on the seaward face of a very large rock where the waves broke over them at low neap tides. The latter specimens were smaller, about 3–5 ins. The fronds a pale translucent rose with patches decidedly greenish in colour. They retained their colour well on drying. (Most of the Anamabu material is young and sterile. C.I.D.) The other specimens were much darker red with an olive tinge, larger, from 9 to 16 ins., and somewhat tougher in consistency.

Cryptonemia semi-nervis (*Ag.*) *J. Ag.* in Öfvers. K. Vet. Akad. Forhandl. Stockholm 11 : 1847.

Prampram Jan. '46 ♀, Nov. '48, Oct. '41, Sept. '43 ♀, May '39, July '39, ♀.

Plants anything from 2 6 ins. generally growing through a dense mat of a species of *Haliseris* under the overhanging tops of large rocks, which have been scooped out to form deep concavities. Also on the lower edges of these ledges, and on low-lying totally submerged rocks. Never exposed unless tides exceptionally low, and then continually wave-swept. Thalli bright crimson when young, older ones sometimes yellowish to olive green, with only ultimate tips crimson. Old plants often become very leathery and curled with numerous proliferations giving a crimped appearance ; often encrusted with Zoophytes, especially on stipe and

lower portions of thallus. Young plants have a short stipe which broadens out fairly quickly and is either broadly rounded or sub-dichotomously branched at the tip which is the widest portion. In older plants the stipe may be an inch or more long supporting more than one thallus, and comparatively stout ; can be fairly satisfactorily dried without pressing. Quite common in the sub-littoral with outliers in the sub-littoral fringe and Outer Zone. November to February is a period of very low tides, and in November possibly for this reason, it appears to die down especially in the latter regions.

SOLIERIACEAE

Agardhiella tenera (*J. Ag.*) *Schmitz* in Flora 72 : 441 : 1889.

Prampram Jan. '46.

The plants were found on rocks in deep water in the Outer Zone. This is the only record so far. They form rose-red much branched bush-like plants about 4–5 ins. high. A similar plant gathered nearer shore in Labadi may prove to be the same.

GRACILARIACEAE

Gracilaria confervoides (*L*) *Grev.* Alg. Brit. 123 : 1830.

Prampram, Aug. '43, Christiansborg Oct. '41. ♀.

Plants variable, they may be filiform single or branched threads, yellowish purple-brown from 6–9 ins., growing through sand at the edge of the beach relatively exposed, in which case they are seldom branched ; or growing in shallow somewhat sheltered positions, when branching is common, the former are probably just impoverished forms. Latterly plants up to 18 ins. have been found at the edge of the sand, but well sheltered by rocks.

Large, 18 ins. plants very profusely branched and darker brown in colour were once found growing among other algae on large rocks in the Middle Zone at Prampram.

Gracilaria henriquesiana. *Hariot* in Journ. de Bot. 2nd Ser. I : 162 : 1908.

Prampram, Sept. '43.

Very ubiquitous, abundant all the year round ; a common and striking plant along the entire coastline. Forms dense fringes on the large rocks in the region between low Springs and low Neaps, usually thickest 3–6 ins. below the rock top, especially on the sides and inner landward faces. On the rock tops usually on the landward side of minor irregularities or deep crevices, fringing rather than growing upright. In mid and high tide areas, it may grow upright from rock tops, or, half buried in sand in shallow sand covered rock pools.

GIGARTINACEAE

Gigartina acicularis (*Wulf.*) *Lamour.* in Ann. Mus. d'Hist. Nat. 20 : 136 : 1813.

Christiansborg, Oct. '41. .

Dark red-brown to olive when fresh, often with light yellowish cross striations giving a banded effect. Dries out purplish, later fading to red-brown. Cartilaginous filiform fronds irregularly branched, spreading over the rock in small patches. Ramuli few, secund and often

strongly recurved. Softly cartilaginous when young, becoming hard and wiry when old. On tops of rocks near low tide mark and also further out in the Middle Zone.

RHODYMENIACEAE

Rhodymenia palmetta (*Esp.*) *Grev.* Alg. Brit. 88 : 1830.

Prampram, Aug.–Sept. '45.

Rare ; in small crimson patches generally growing with or near *Cryptonemia* on the overhangs of large rocks in the Outer Zone, not uncovered except at very low Spring tides, and then wave washed. Plants small, crimson, rather translucent, spreading over the rock surface forming a loose mat.

CERAMIACEAE

Centroceros clavulatum (*Ag.*) *Mont.* Exploration scient. de l'Algérie, Algues I : 140 : 1846.

Winneba Feb. '49. ⊕. Komenda Apr. '49. ⊕. Tantum Dec. '48. ⊕. Prince's Town Apr. '49. ⊕.

This species is very common and abundant all along the coast, varying somewhat in form according to its habitat. In Tantum and Prince's Town, where the foreshore is rocky with enormous boulders, the plants are usually rather short, about an inch long, growing in dense mats on the rocks, and of a rather pale yellowish colour except at the apices which are reddish-brown. On submerged rocks they are deep reddish brown.

DELESSERIACEAE

Taenioma perpusillum (*J. Ag.*) *J. Ag.* Sp. Alg. II : 1257 : 1863.

Sekondi Apr. '49. ♀. Prampram Jan. '49. ⊕.

The Sekondi specimens were growing in a hollow of a large rock at the sea edge, that is to say near where the rock platform ends. They formed a short blackish slimy mat whose individual plants were fine and in fruit. The Prampram specimens were collected with a mass of red epiphyte from the rocks of the Outer Zone on the east of the mapped area, which were exposed but wave washed for most of the time. It was impossible to tell them apart in the field, so they were roughly sorted into two bottles labelled red epiphytes and red epiphytes greenish at tip. These came from the former bottle.

Caloglossa leprieurii (*Mont.*) *J. Ag.* Sp. Alg. III : 499 : 1876.

Nr. Ancobra Apr. '49. ⊕.

Collected at low tide from stones and rocky bank at mouth of a stream near the Ancobra river, under the bridge on the western bank. The bridge shaded the rocks and no doubt at high tide they would be covered or at least continuously washed. When gathered it was rather dried out and seemed to be a small brownish black encrusting form, rather net-like in appearance.

RHODOMELACEAE

Polysiphonia ferulaceae *Suhr* in J. Ag. Sp. 11 : 980 : 1863

Prampram Apr. '41, July '41, Jan. '49, Sept. '43, ⊕, March '39, Oct. '41.

Sometimes almost covering the whole of a rock top, but more often in interrupted patches which may be quite extensive. Since the local

inhabitants have been breaking down the upstanding portions of the rocks in the Inner Zone it has come in all over the low-lying denuded areas, right up near high tide mark. When young and when the older fronds are lifted by the tide the plants appear a reddish purple-brown, but when left exposed at low tide the full grown plants are about 3 ins. long and lie in dense masses like straight purplish black hair.

Bryocladia thyrsigera (*J. Ag.*) *Schmitz* in Falkenb. Rhodomelaceen 169 : 1901.

Christiansborg Aug. '39. Anamabu Dec. '45.

This species forms thick heavy fringes to large rocks which appear black in the mass, and brownish-green if individual fronds are isolated. Isolated plants sometimes grow on the sand covered rock bases, and the appearance of the whole plant is of a small bush with densely set linear leaves. Toughly cartilaginous, making it wiry and springy to the touch. A very striking and distinctive species. Common all along the coast where there are rocks protruding through a sand covered sea floor, and though often isolated usually very abundant on the rocks it grows over.

Lophosiphonia obscura (*Ag.*) *Falkenb.* Rhodomelaceen 500 : 1901.

Accra Oct. '41.

Growing on shale rock ledges about 5 ft. above ground level and sheltered by an overhanging cliff face which forms a shallow open cave. The species looks rather like a blackish, dried up, fine leaved moss forming a short felt on the rock.

Murrayella periclados (*Ag.*) *Schmitz* in Ber. d. deut. bot. Ges. XI : 227 : 1893.

Tantum Dec. '48.

Found in two different places, one lot of plants were growing on the byssus threads of mussels attached to a large rock ; the second gathering was from the overhang of another large rock in the mid-tide zone where the sea washed up a gulley around the base of the rock. The roof of the cave formed by the overhang is generally splashed and sometimes immersed by the waves sluicing through the gulley. The plants form a moss-like close fitting felt over the face of the rock.

Bostrychia tenella (*Vahl*) *J. Ag.* Sp. Alg. II : 869 : 1863.

Prince's Town Apr. '49. ⊕. Komenda Apr. '49.

On large fallen rocks at the base of the headland on which Komenda College stands.

The rocks lie in a tumbled mass at the foot of the cliffs and the plants seem to prefer the flat surfaces of those whose strata have been displaced from the horizontal to the vertical. The Prince's Town specimens are similar in appearance and also grow on the cleavage face of a large boulder in a sheltered spot at the foot of the hill on which the castle stands.

Laurencia papillosa (*Forsk.*) *Grev.* Alg. Brit. LII : 1830.

Winneba Jan. '45. Iture (Nr. Elmina) Apr. '45.

Plants with coarse yellowish rather stiff main branches ending in reddish rather bulbous ramuli ; the whole plant having a turgid appearance. Cartilaginous and brittle, on wave washed rocks all over the intertidal zone ; forming small shrubby clumps conspicuous on the tops of the rocks.

NOMOCHARIS AND LILIUM.

J. Robert Sealy.

Introduction.

The genus *Nomocharis* Franchet was established in 1889 (Journ. de Bot. **3,** 113, t.3) to accommodate a plant found in western China by the French missionary and plant-collector the Abbé Jean Marie Delavay. This plant, *Nomocharis pardanthina* Franchet, differed so strikingly from *Lilium* by its flat perigone with conspicuously erose inner tepals, by the dark-coloured base of the inner tepals ornamented with a number of low ridges of tissue flabellately arranged, and by the stamens with thick fleshy sub-cylindrical filaments bearing at the top a needle-like awn on the end of which the anther is attached, that it undoubtedly deserved generic distinction (see fig. 1, A-C). Four other species agreeing with *N. pardanthina* in essential characters have since been described, namely *N. meleagrina* Franchet, *N. mairei* Lévl., *N. basilissa* Evans, and *N. farreri* (Evans) Harrow (see Bot. Mag. sub t. 9557 : 1939). In 1918 Sir Isaac Bayley Balfour widened the scope of *Nomocharis* to include species which, until then, had been placed in *Lilium* or *Fritillaria* (Trans. Bot. Soc. Edinb. **27,** 273–300), while in 1925–6 E. H. Wilson (Lilies E. Asia, 13 : 1925) and W. E. Evans (Notes Roy. Bot. Gard. Edinb. **15,** 1–46, t. 199–212 : 1925 ; 191–197, t. 218 : 1926) carried Balfour's concept of *Nomocharis* to its logical conclusion. The result of this widening of the limits of the genus was, however, to blur the differential characters separating *Nomocharis* from *Lilium*, as was clearly explained by Mr. Evans himself in the following passage which appeared in Woodcock & Coutts, Lilies, 225 (1935) :

> " Your request for an up-to-date description of *Nomocharis*, sufficient to bring out its differences from *Lilium* and *Fritillaria*, has given me a task approaching the impossible. The truth is that the characters originally attributed to *Nomocharis*, as constituted by Franchet for the two species then intended to fill it, have gone, one by one, till there is hardly anything left between it and *Lilium*, except the generally more patent tepals and, I think, the usually shorter anthers in *Nomocharis*. Even as regards these two points there are exceptions . . . . "

In the spring of 1948 plants of a " new Nomocharis ", grown from seeds collected by Capt. F. Kingdon-Ward in Manipur, flowered for the first time in English gardens, and in the course of an investigation into the taxonomic position of these plants, it became necessary to consider the problem of distinguishing *Nomocharis* from *Lilium*. It quickly became evident that certain species included in *Nomocharis* appeared to form a series connecting the true *Nomocharis* species to *Lilium*, and that the inclusion of some of these species in *Nomocharis* rather than *Lilium* was open to question. It therefore seemed advisable to examine the relationships of these " intermediate " species, but before this could be done it was necessary to consider what characters could be regarded as of generic value for the separation of *Nomocharis* sensu stricto (i.e. *Nomocharis* sect. *Eunomocharis* Balf. f.) from *Lilium*. The problem of distinguishing the two genera therefore falls into two parts, first consideration of the generic characters and secondly examination of the position of the doubtful species ; and it is dealt with below under these two headings.

Generic Characters.

Lilium, as generally defined now-a-days, that is, excluding the plants placed in *Notholirion* and *Cardiocrinum* and those which have been referred to *Nomocharis*, embraces a heterogeneous assemblage of species exhibiting a wide range of variation. The plants may be from one foot to six feet in height ; the leaves may be scattered or crowded, alternate or whorled, and from broadly ovate to linear and grass-like ; while the stem may carry from one to many flowers. None of these characters provides generic criteria so far as *Lilium* and *Nomocharis* are concerned, nor do the fruits and seeds. Attention has therefore been directed to the form of the bulb and the characteristics of the individual flowers. The various features can be conveniently dealt with under separate headings as follows :

(1) Bulbs. A very wide range of variation in shape, size, colour, structure, and mode of renewal, is found in the bulbs of *Lilium*. Commonly the bulb consists of scales which increase in size upwards and inwards and overlap one another only in the lower part, so that they are all visible and form a more or less regular pattern over the whole bulb—e.g. *L. candidum*, *L. longiflorum*, *L. hansonii*, *L. pyrenaicum*, *L. maculatum*, *L. superbum*, *L. philadelphicum*, *L. canadense*, etc. This is the type of bulb generally accepted as " typical " of the genus, and the shape may be anything from wide ovoid to depressed globose. In many species, however, the bulbs are not of this type. Instead they have their outer scales subequal to the rest (that is, the outer scales vary from a little shorter than, to a little longer than, the inner), and since the scales are erect or ascending, the outer enclose and more or less hide the inner, the latter being visible, if at all, only in the apical part. Bulbs of this type vary greatly in size and shape, and in the number and size of their scales ; they may be oblate with numerous wide scales (*L. leucanthum*), or ovoid-oblate with relatively few wide scales (*L. cernuum*, *L. callosum*, *L. davidii*), or ovoid-globose with numerous broad (*L. ochraceum*) or narrow (*L. pomponium*, *L. bolanderi*) scales, or the bulb may be globose with elongated scales (*L. tigrinum*), or ellipsoid-ovoid with wide scales (*L. amabile*) or with numerous long narrow scales (*L. regale*), or it may be wide ovoid to globose with ovate to lanceolate scales (*L. amoenum*, *L. bakerianum*), or ovoid with few wide scales (*L. pumilum*), or ovoid with numerous lanceolate scales (*L. sempervivoideum*), or the bulb may be noticeably elongated with relatively few narrow scales (*L. polyphyllum*) ; then there is *L. catesbaei* with an elongated bulb formed of relatively few narrow truncate leaf-bases, and finally there are the " bulbs " which consist of numerous crowded erect narrow scales arranged along a short rhizome (e.g. *L. washingtonianum*, *L. parryi*, *L. columbianum*, and *L. humboldtii*). In addition, there are lily bulbs more or less intermediate in structure between those in which all the scales are visible and those in which the outer scales more

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Fig. 1. **A–C,** *Nomocharis pardanthina*, **A** plant, $\times \frac{1}{2}$, **B** base of inner tepal, $\times 2$, **C** filament, $\times 2$. **D,** *N. farreri*, upper part of plant, $\times \frac{1}{2}$. **E–G,** *N. mairei*, **E** flower $\times \frac{1}{2}$, **F** base of inner tepal, $\times 1\frac{1}{2}$, **G** stamen, $\times 2$. **H–K,** *N. synaptica*, **H** upper part of plant, $\times \frac{1}{2}$, **I** base of inner tepal, $\times 2$, **J** filament $\times 2$, **K** gynoecium and one stamen, natural size. **L–N,** *N. saluenensis*, **L** inflorescence, $\times \frac{1}{2}$, **M** base of inner tepal, $\times 2$, **N** filament $\times 2$. **O,** *N. aperta*, base of inner tepal, $\times 2$.
D after Bot. Mag. t. t. 9557 ; **E–G** after drawings by Stella Ross-Craig ; **L** after Bot. Mag. t. 9296 ; remaining figures drawn from herbarium specimens.

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or less enclose the rest. As regards colour, this varies from white (e.g. *L. longiflorum*) to yellow (e.g. *L. martagon*) or deep red-purple on exposure (e.g. *L. regale*). In some lilies the bulb-scales are markedly constricted, e.g. *L. medeoloides*, *L. dauricum*, *L. philadelphicum*, and *L. pardalinum*. Finally there is the question of the renewal of the bulb. In the majority of species of *Lilium* the new bulb arises in the axil of one of the scales of the existing bulb, but there are certain species (e.g. *L. canadense*, *L. superbum* etc.) in which the new bulb is formed at the end of a stolon which itself arose in the axil of a scale of the existing bulb. This synopsis of the range of variation in *Lilium* bulbs is not exhaustive, but it gives an indication of the great diversity to be found in the genus.

In *Nomocharis* the bulb varies from narrowly ovoid or oblong-ovoid to subglobose ; the scales are lanceolate to ovate, and the outer are larger than and enclose the inner. The bulbs are thus of the same type of construction as is found in *Lilium* ; they much resemble those of *L. amoenum*, *L. sempervivoideum*, *L. concolor*, *L. pumilum*, and *L. bakerianum*, and are not radically different from those of *L. polyphyllum*, *L. pomponium*, and *L. ochraceum*. It is evident that no distinction can be drawn between *Lilium* and *Nomocharis* on bulb-characters. In fact, various species of *Lilium* differ from one another more in the bulbs than do the species of the two genera.

(2) Shape of the Perigone. The flowers of *Lilium* species, like the bulbs, present an extraordinary range of variation. They may be long slender trumpet-shaped (e.g. *L. formosanum*), large funnel-shaped (e.g. *L. brownii*, *L. regale*), smaller and funnel-shaped (e.g. *L. bakerianum*, *L. rubellum*, *L. candidum*), small cylindric-campanulate (e.g. *L. bolanderi*, *L. grayi*), small funnel-shaped to cupular (*L. sempervivoideum*, *L. amoenum*), or the perigone may be funnel-shaped with the upper half of the tepals revolute (e.g. *L. monadelphum*, *L. ochraceum*, *L. polyphyllum*, etc.), or the tepals may be revolute for much of their length (sect. *Martagon*), or the tepals may spread widely and recurve as in *L. auratum*). In all these examples the flower is horizontal to nodding, but there are yet other species in which the flower is held erect, and in these the perigone may be vase-shaped (*L. maculatum*, *L. bulbiferum*), or more wide-spreading with the tepals narrowly clawed and widely separated at the base (*L. catesbaei*, *L. philadelphicum*), or very shallowly funnel-shaped with the sepals wide-spreading (*L. concolor*). Despite this wide range, the perigone in *Nomocharis* is unlike anything in *Lilium*. The tepals spread widely from the base or, at the most, are only slightly curved, so that the perigone is either quite flat or saucer-shaped (fig. 1). In addition the inner tepals are often conspicuously erose, though sometimes almost entire in *N. farreri*, and always entire in *N. basilissa*; they are notably spotted or blotched in all species except *N. basilissa*; and they are dark-coloured at the base, the dark areas forming, with the equally dark-coloured filaments, a prominent " eye " in the centre of the flower (fig. 1, A, D, E). The shape of the perigone and the markings of the inner tepals combine to give the flower the different appearance from everything in *Lilium*, and constitute a most obvious generic characteristic.

(3) Nectaries. In the majority of *Lilium* species both the outer and inner tepals are narrowly grooved for some distance from the base, these

grooves being nectariferous. They may be quite bare as in *L. taliense*, *L. bakerianum*, *L. rubellum*, etc., or more or less densely bordered with papillae, e.g. *L. duchartrei*, *L. bulbiferum*, *L. davidii*, or the groove may be almost covered over by ridges of tissue on either margin as in *L. martagon*. The tepals are curved at the base, but in *L. ochraceum* and *L. taliense* the outer are clearly saccate. In *L. superbum*, *L. pardalinum*, and *L. occidentale* the inner tepals are sulcate but the outer are not ; instead the whole of the base of the outer tepals forms a short broad channel. In a small group of species comprising *L. bolanderi*, *L. grayi*, *L. canadense*, *L. parvum*, and *L. maritimum*, the inner tepals are shallowly channelled at the base, but the outer are not, their bases being strongly curved and green, and apparently nectariferous, but the surface is not grooved or channelled in any way. Finally there is *L. candidum* (the type-species of the genus *Lilium*) whose outer tepals have a small green nectarial area at the very base which is too short to be described as a groove or channel, and whose inner tepals have a short green channel.

In addition to the nectarial furrows, certain species of *Lilium* have irregular outgrowths from the nerves in the lower part of both outer and inner tepals. These outgrowths take the form of more or less erect linear or oblong processes or short low ridges of tissue which are sometimes lobed or branched ; they may be few in number and situated just beyond the distal end of the nectarial furrow as in *L. chalcedonicum*, or many and prominent and extending downwards on either side of the nectarial furrow as well as beyond it, e.g. *L. auratum*, *L. speciosum*, and *L. henryi*, or the outgrowths may be confined to the base of the tepals on either side of the nectarial groove as in *L. maximowiczii*, while in some forms of *L. bulbiferum* the outgrowths may form interrupted crests beyond or alongside the groove.

In *Nomocharis* the outer tepals are not nectariferous, or only slightly so at the very base where there is sometimes a small stain of colour ; the inner tepals, however, are prominently dark-coloured and glistening at the base, the centre of the dark area being occupied by a short channel on either side of which are low unequal flabellately arranged ridges of tissue (fig. 1, B, F, I). Clearly *Nomocharis* is quite distinct from *Lilium* in its nectarial arrangements, and these may be regarded as valuable generic characters.

(4) Stamens. In both *Lilium* and *Nomocharis* the anthers are dorsifixed, and though often held erect, at least for a time, they are, in fact, truly versatile. In *Nomocharis* the anthers are generally small, but they are no smaller than those of some *Lilium* species, e.g. *L. grayi* and *L. parvum*. The filaments in the two genera are, however, markedly dissimilar, for whereas in *Lilium* they are slender and taper gradually from base to apex, in *Nomocharis* the filament consists of a fleshy cylindrical or turbinate body with a needle-like awn at the top, the anther being borne on the end of this awn (fig. 1, C, G). Here again is a good generic character.

(5) Gynoecium. The only difference in the gynoecia of the two genera is that, whereas in the majority of *Lilium* species the style greatly exceeds the ovary, in *Nomocharis* the style is subequal to the ovary. This difference does not hold good when all the species of *Lilium* are considered. Thus the style is from twice the length of the ovary to subequal to it in

L. bakerianum ; the style is only a little longer than the ovary in *L. pyrenaicum*, *L. hansonii*, *L. chalcedonicum*, and *L. pomponium* ; the style is subequal to or a little longer than the ovary in *L. pumilum*, *L. bolanderi*, and *L. carniolicum* ; the style is shorter than the ovary in *L. callosum*, *L. kelloggi*, and *L. stewartianum*, while in *L. concolor* it is much shorter. Clearly style-length is not a good generic character so far as *Lilium* and *Nomocharis* are concerned. It may be noted that in general the length of the style depends on the shape and size of the perigone. Normally the style is no longer than is necessary to carry the stigma to the mouth of the perigone or just beyond, though, of course, the spreading or recurving of the tepals may cause it to be well-exserted, markedly so when the tepals are revolute.

(6) Conclusions. As a result of this survey of possible generic characters, it appears that *Nomocharis* sens. str. is distinguished from *Lilium* by the following features :

(i) the open form of the perigone with its tepals spreading widely from the base to give a flat or saucer-shaped flower,

(ii) the inner tepals dark-coloured at the base and there with a series of low ridges of tissue flabellately arranged on either side of a short median channel ; the outer tepals flat at the base, not channelled nor saccate, and apparently not nectarial,

(iii) the filaments consisting of a fleshy cylindrical or turbinate body with a needle-like awn at the top.

Position of the Doubtful Species.

It is now possible to consider the species which, as mentioned earlier, seem to form a series connecting *Lilium* and *Nomocharis*, and whose inclusion in the latter genus was largely responsible for obscuring its distinguishing characters. The species, to which I have added two other related species, one recently described and another described further on in this article, are the following.

Nomocharis synaptica Sealy.

A new species described below (p. 296, fig. 1, H-K) which is a typical *Nomocharis* in every respect except the stamens. These have filaments which appear, in the dried state, to be subulate, but which upon closer examination are found to be fairly stout, somewhat flattened, dark purplish, and tapered gradually from the base to within 2 mm. of the apex, and there contracted to a fine needle-point which is pale ochre in colour. On all other characters the species must obviously be referred to *Nomocharis*, and the distinguishing characters of that genus have to be emended to include the slender type of filament, which, so far as is known, is not found in *Lilium*. It can be regarded as an intermediate state

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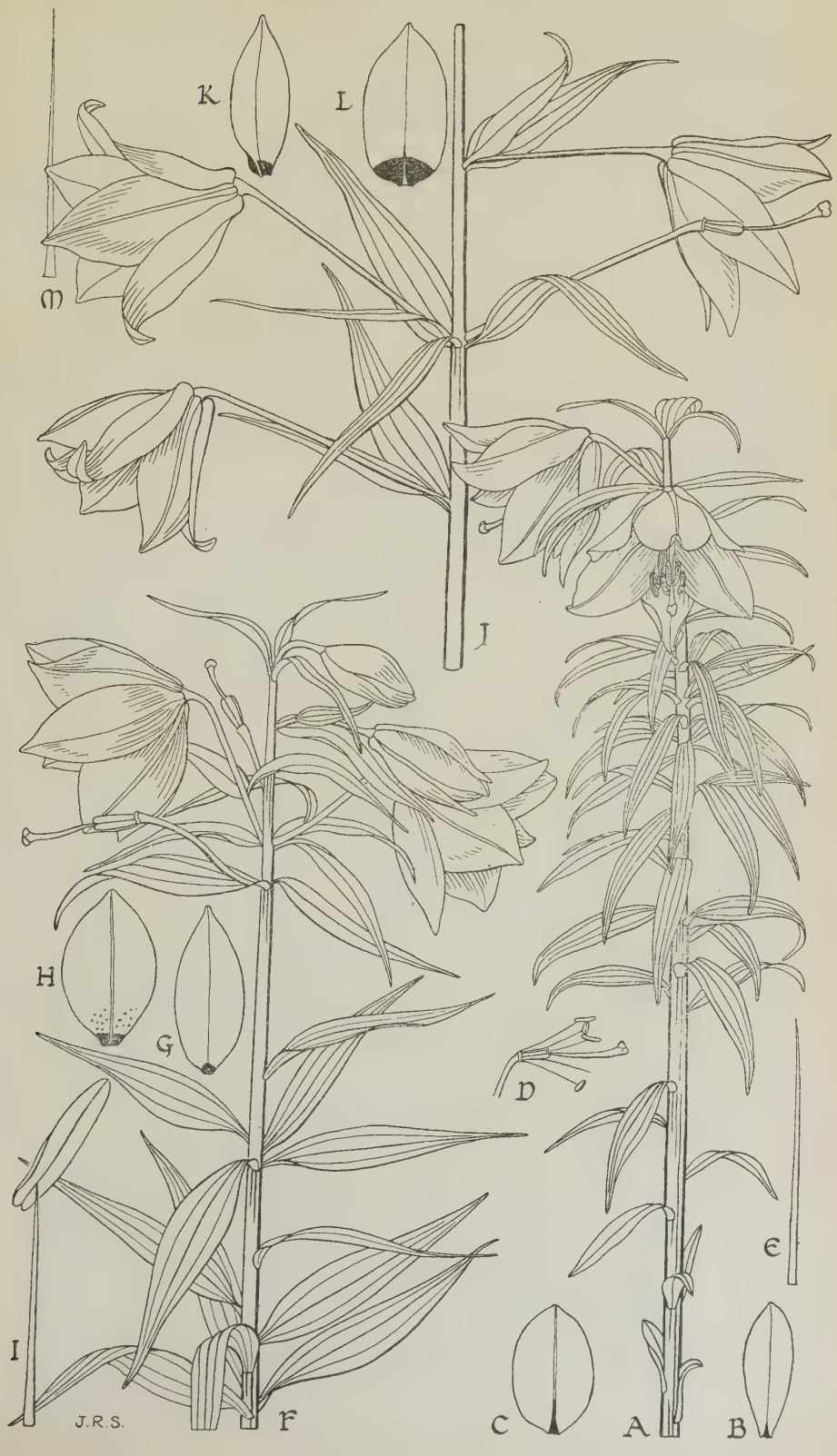
Fig. 2. **A–E,** *Lilium mackliniae*, **A** plant, × ½, **B** outer tepal, × ½, **C,** inner tepal, × ½, **D** gynoecium and androecium (one stamen removed), × ½, **E** filament, × 2. **F–I,** *Lilium henrici* var. *maculatum*, **F** upper part of plant, × ½, **G** outer tepal, × ½, **H** inner tepal, × ½, **I** stamen, × 2. **J–M,** *Lilium henrici* var. *typicum*, **J** part of inflorescence, × ½, **K** outer tepal, × ½, **L** inner tepal, × ½, **M** filament × 2.
A after Bot. Mag. N. Ser. t. 108 ; the remainder drawn from herbarium specimens.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between the subulate filaments of *Lilium* and the fleshy awn-topped filaments of *Nomocharis* sens. str.

Nomocharis aperta (Franchet) E. H. Wilson

This has the typical flat *Nomocharis* perigone with the outer tepals flat, not channelled and not nectarial, at the base, and with the inner tepals dark-coloured, shortly channelled, and nectariferous. But instead of the low ridges typical of *Nomocharis*, the dark-coloured area in *N. aperta* is occupied by two lobulate fleshy swellings, one on either side of the channel (fig. 1, O). There is nothing like this in *Lilium*, but there is no difficulty in regarding it as comparable with the condition in *Nomocharis*, the basal swellings being looked on as equivalent to the ridges of that genus. The filaments in *N. aperta* are like those of *N. synaptica*, so that in this character too the species agrees better with *Nomocharis*. It will be noticed that *N. aperta* is linked to *Nomocharis* sens. str. by *N. synaptica* which agrees with the former in the stamens and the latter in the base of the inner tepals. *N. aperta* is well-illustrated in Bot. Mag. t. 9533 (1938).

Nomocharis saluenensis Balf. f.

The perigone in this species is usually wide-spreading and saucer-shaped or even flat, as in *Nomocharis*, but sometimes the flowers are distinctly cupular (fig. 1, L) and thus show an approach to *Lilium*. As in *Nomocharis*, the outer tepals are flat at the base and not nectarial, while the inner are dark-coloured, channelled, and nectariferous. The latter, however, resemble *N. aperta* in having a swelling, instead of a series of ridges, on either side of the channel at the base, but whereas in *N. aperta* the swellings occupy the whole of the dark-coloured area, in *N. saluenensis* they form low rounded transverse rims at the top of the dark area, and below them the tepal is slightly concave (fig. 1, M). This is clearly a modification of the condition in *N. aperta*, and is quite unlike anything in *Lilium*. The filaments in *N. saluenensis* (fig. 1, N) are like those of *N. synaptica* and *N. aperta*. The latter is, in fact, the nearest affinity for *N. saluenensis*, and both have to be referred to *Nomocharis*.

Lilium mackliniae Sealy

The perigone is cupular to campanulate (fig. 2, A ; see also Journ. R.H.S. **74,** fig. 116–118 : 1949) and very similar to that of *Lilium amoenum* (fig. 3, B) in shape. The outer tepals are noticeably saccate at the base (recalling in this respect *Lilium ochraceum* etc.) and have a short nectarial area, while the inner tepals have a short nectarial groove ; in white flowers these nectarial areas are green and greatly resemble those of *L. amoenium* and *L. candidum* ; in rose-flushed flowers the base of the outer tepals is deeply red-stained. The filaments are subulate and

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FIG. 3. **A,** *Lilium bakerianum* var. *yunnanense*, upper part of plant. **B–E,** *Lilium amoenum*, **B** plant, **C** outer tepal, **D** inner tepal, **E** gynoecium and four stamens. **F–I** *Lilium sempervivoideum*, **F** plant, **G** flower spread out (one outer tepal and two stamens removed), **H** outer tepal, **I** inner tepal. **J–S,** *Lilium souliei* ; **J–M** *Soulie* 1029, **J** plant, **K** outer tepal, **L** inner tepal, **M** gynoecium and four stamens ; **N–R,** *Rock* 23167, **N** plant, **O** outer tepal, **P** inner tepal, **Q** stamen, **R** gynoecium and two stamens ; **S,** *Forrest* 14178, plant. **T–W,** *Lilium georgei*, **T** plant, **U** outer tepal, **V** inner tepal, **W** gynoecium and four stamens ; **Q** × 155, the rest one-half natural size.
B–E after Bot. Mag. N. Ser. t. 73 ; the remaining figures drawn from herbarium specimens.

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slender (fig. 2, D, E). In all these, generic, features *L.mackliniae* agrees with *Lilium* and is far removed from *Nomocharis* (even as emended by the inclusion of *N. aperta* and *N. saluenensis*) and to the former genus it was, and is, referred without hesitation. It is included here because of its relationship to the next species, *L. henrici*, which was included in *Nomocharis* in Mr. Evans' revision of that genus. An account of *L. mackliniae* has appeared in the Botanical Magazine, N. Ser. t. 108.

Lilium henrici Franchet

Of this species there are two varieties (see below, p. 289), var. *maculatum* and var. *typicum*. In var. *maculatum* (fig. 2, F-I) the flowers seem to be cupular or deep cupular and thus similar in shape to those of *Lilium mackliniae* and *L. amoenum*. The outer tepals are curved or slightly saccate, not channelled, and have a small deep red stain at the base inside (fig. 2, G), thus agreeing with species of *Nomocharis*. The inner tepals also agree with *Nomocharis* in coloration, inasmuch as they are deep red at the base with red spots just beyond the blotch (fig. 2, H) ; they are sulcate but lack the ridges or swellings characteristic of *Nomocharis*. The filaments are slender and subulate with a barely perceptable contraction to the needle point (fig. 2, I). In the characters which have been accepted as generic, namely shape of perigone, nectaries, and stamens, the plants agree better with *Lilium*, and are obviously more closely related to *L. mackliniae* than to any species of *Nomocharis*.

L. henrici var. *typicum* (fig. 2, J-M) has a deeply cupular or funnel-shaped perigone, which, like the slender subulate filaments, is wholly in keeping with *Lilium*. The inner tepals are sulcate at the base inside and also prominently stained with deep red, but there are no spots and no ridges or swellings. The outer tepals are quite different, being very strongly saccate to gibbous at the base with the pouch deep red coloured, a condition not paralleled in either *Nomocharis* or *Lilium*, the nearest approach to it being the saccate condition found in some *Lilium* species, notably *L. mackliniae*, where also the base is red-stained. The gibbous base recalls *Fritillaria*, many species of which have the tepals pouched at the base, but in *Fritillaria* all six tepals are pouched, not the three outer as in *L. henrici*, while in all other important characters, bulb, stigma, etc., the latter is completely different from *Fritillaria*.

It is possible that the two varieties of *L. henrici* may represent distinct species, but they agree in so many respects that, for the present at least, it seems advisable to regard them as conspecific. *L. henrici* is therefore accepted as a variable species, in which the perigone ranges from cupular to funnel-shaped, and the outer tepals from scarcely, if at all, saccate to

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FIG. 4. **A–D,** *Lilium euxanthum*, **A** plant, **B** outer tepal, **C** inner tepal, **D** gynoecium and four stamens. **E–O,** *Lilium nanum* ; **E–H** *Duthie* 173, **E** plant, **F** inner tepal, **G** outer tepal, **H** gynoecium and four stamens ; **I,** cultivated plant ; **J–L** *Dr. King's Collector*, **J** outer tepal, **K** inner tepal, **L** gynoecium and four stamens ; **M–O** *Norton* 183, **M** inner tepal, **N** outer tepal, **O** gynoecium and three stamens. **P–Q,** *Lilium lophophorum* subsp. *linearifolium*, **P** plant, **Q** gynoecium and four stamens. **R–Z** *Lilium oxypetalum* ; **R,** plant of *Duthie* 182 ; **S–V,** *Duthie* 6039, **S** plant, **T** outer tepal, **U** inner tepal, **V** gynoecium and four stamens ; **W Z** from a cultivated plant, **W** upper part of plant, **X** outer tepal inner surface and side view, **Y** inner tepal, **Z** gynoecium and four stamens. **C, B, F, G,** natural size ; remainder one-half natural size.
I after a painting by Stella Ross-Craig, **W–Z** from a living specimen, remaining figures drawn from herbarium specimens.

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gibbous. It is clearly to be referred to *Lilium* rather than *Nomocharis*, and its inclusion in that already heterogeneous genus will mean that *Lilium* incorporates plants with the outer tepals gibbous at the base as well as those with outer tepals slightly to strongly saccate.

Nomocharis souliei (Franchet) W. W. Sm. & W. E. Evans

Originally described as a *Fritillaria*, this dwarf species (fig. 3, J-S) much resembles certain species of that genus in being one-flowered with the flowers nodding and campanulate, deep brownish-crimson in colour, and in having the outer tepals markedly gibbous at the base. The inner tepals, however, are sulcate at the base and have no other ornament, while the bulb and stigma agree with those of *Lilium* and *Nomocharis* and not with those of *Fritillaria*. In all generic characters the plant is widely different from *Nomocharis*, but there seems no reason why it should not be included in *Lilium*, if, as proposed above, the limits of that genus be widened to include *L. henrici*, in which the outer tepals are also gibbous at the base. Apart from the flower-colour, there is more than a passing resemblance between plants of *N. souliei* and such lilies as *L. bakeriauum* var. *yunnanense*, *L. amoenum*, and *L. sempervivoideum*, as will be evident from fig. 3.

Nomocharis georgei W. E. Evans

A most distinctive species (fig. 3, T-W) allied to *N. souliei*, with which it agrees in being dwarf and one-flowered, in the perigone being campanulate, in the outer tepals strongly gibbous at the base, the inner tepals simply sulcate, and the filaments subulate. The flower-colour, rich soft blue-purple deepest on the outside according to the collector, is unique, while the crowded leaves further distinguish it from *N. souliei* as will be seen from fig. 3. The two species are, however, congeneric, and if *N. souliei* is transferred to *Lilium*, *N. georgei* must also be placed in that genus.

Nomocharis section *Oxypetala* Balf. f.

The section comprises four species which agree so well in technical characters that they can be considered together. Three of the species, *N. nana* (Klotzsch) E. H. Wilson (fig. 4, E-O), *N. oxypetala* (Royle) E. H. Wilson (fig. 4, R-Z) and *N. lophophora* (Bur. & Franch.) W. E. Evans (fig. 4, P, Q ; fig. 5), are very variable and have been referred to both *Lilium* and *Fritillaria*, while the fourth species, *N. euxantha* W. W. Sm. & W. E. Evans (fig. 4, A-D), is a more recent discovery known only from the material collected by Forrest and Farrer. All are dwarf one-flowered plants with horizontal or nodding funnel-shaped or cupular flowers, which for the most part agree in shape with *Lilium*. In the figure of *N. nana* in the Botanical Magazine (t. 4731, reproduced in Elwes, Monogr. Lil. t. 5), however, the perigone is shown wide-spread as in *Nomocharis*, but in the few living plants I have seen the perigone was decidedly funnel-shaped or cupular, while the dried specimens of wild plants give the impression that the flowers were from cupular to widely and shallowly funnel-shaped, and do not suggest that the perigone was ever so widely open as shown in the figure. Incidentally the flowers shown in the plates mentioned above are one-and-a-half times the size of those in the original drawing. All four species of sect. *Oxypetala* have yellow flowers,

while *N. nana* and *N. lophophora* also include plants with purplish flowers ; the flowers may be unspotted, or finely spotted towards the base, or more heavily spotted throughout. The principal characteristic of the section, however, is that the inner tepals have, inside at the base, one or more lacinate pale crests on either side of a short nectarial groove, which seems generally to be green or greenish (fig. 4, F, M, Y). The crests are not invariably present and are sometimes weakly developed or restricted to one side of the groove (fig. 4, U) ; in *N. euxantha* they are commonly weakly developed (fig. 4, C) and may be completely absent (var. *imberbis*), as is also the case in some specimens of *N. nana*. The outer tepals generally lack the crests (fig. 4, B, G, T, X), but they are sometimes present, usually weakly developed (fig. 4, N) ; these tepals are, however, always clearly saccate at the base and usually also shortly grooved, the sac and groove being nectarial. The outer tepals are thus very different from those of *Nomocharis*, but resemble those of some lilies, e.g. *L. mackliniae* and *L. henrici*, while the presence of a few outgrowths—the weak beginnings of crests—found in some outer tepals recalls the condition found sometimes in *Lilium*. As to the inner tepals, they could be compared with the inner tepals of *Nomocharis* if the crests are regarded as being similar to the low ridges of that genus, though the tepals are not dark-coloured at the base as is usual in that genus ; or they can be compared with the inner tepals of *Lilium*, the crests being regarded as similar to the outgrowths found in that genus, and as being especially comparable with the condition found in forms of *L. bulbiferum*, where, as already mentioned, the outgrowths sometimes form interrupted crests. In those inner tepals where the crests are much reduced, e.g. *N. euxantha*, the condition is particularly reminiscent of that in *Lilium* species, and it may be noted that the crests in sect. *Oxypetala*, like the outgrowths in *Lilium*, arise from the nerves of the tepal. Finally, the filaments in sect. *Oxypetala* are subulate as in *Lilium*.

To sum up, the species of sect. *Oxypetala* differ so markedly from *Nomocharis* in the form of the perigone, outer tepals and stamens, that their retention in that genus is not justified. On the other hand, they agree with *Lilium* in these features, and since the cristate inner tepals are not incompatible with that genus, there is no reason why the species of sect. *Oxypetala* should not be included in *Lilium* pending further investigation of the limits of that genus. It is possible that the species of sect. *Oxypetala*, perhaps with the addition of *L. souliei* and *L. georgei*, may have to be given the rank of a distinct genus, but this is a question that cannot be decided until the whole of *Lilium* sensu latiore has been subjected to a critical taxonomic investigation.

Conclusions.

If the species dealt with above are left on one side, *Nomocharis* is a small, homogeneous, very natural genus, differing markedly from the large, heterogeneous *Lilium* in its wide open perigone, outer tepals not channelled or nectarial, inner tepals dark-coloured at the base and so forming a prominent " eye " in the centre of the flower, the dark area occupied by low ridges of tissue flabellately arranged on either wide of a short median channel, and in its filaments being fleshy and cylindrical or turbinate with an awn at the top. Of the species whose position is more

or less doubtful, *N. synaptica*, *N. aperta*, and *N. saluenensis* can be accommodated in *Nomocharis* without spoiling its essential characters. The inclusion of the remaining species in that genus would, and did, destroy its distinctiveness, and would leave no characters by which it could be differentiated from *Lilium*. On the other hand, there seems no reason why these species should not be placed in *Lilium*. *N. souliei*, *N. georgei* and the species of *Nomocharis* sect. *Oxypetala* all have much in common ; they all differ greatly from *Nomocharis* in perigone-shape, in nectaries of the outer tepals, and in the stamens, but agree in these characters with *Lilium*, so that there can be no doubt that they would be better placed in the latter genus. Finally there is *N. henrici*, whose var. *maculata* might conceivably be included in *Nomocharis* as an aberrant form (i.e. having a cupular, not wide-open perigone, lacking the ridges or swellings on the inner tepals, and having subulate, not fleshy, filaments), but whose var. *typica* so evidently resembles *N. souliei* and its allies in the pouched nectaries of the outer tepals, and whose nearest ally seems to be *Lilium mackliniae*, so that when the species is considered as a whole it must evidently be referred to *Lilium*. It is therefore proposed that *Nomocharis* should be restricted to the species of sect. *Eunomocharis* and the three other species mentioned above, and that the remainder of the species currently included in *Nomocharis* should be transferred to *Lilium*. Such nomenclatural changes as are necessary are made below, where observations on certain species are also given.

Lilium bakerianum

A very variable and wide-spread species, distributed—albeit discontinuously—from the Southern Shan States eastwards to Kweichow, and—more continuously—north-eastwards through the high mountains of north-west Yunnan to southern Szechuan and western Sikang. Four described species are included in the synonymy, namely *L. lowii* Baker, *L. delavayi* Franchet, *L. yunnanense* Franchet, and *L. linceorum* Lévl. & Van. The second of these was recognized as a distinct variety by E. H. Wilson in 1925, but the fact that the last two represented equally distinct entities was inexplicably overlooked by him and by all subsequent writers. It was therefore something of a surprise to find, when sorting the specimens in the Kew Herbarium, that the material from eastern Yunnan and Kweichow formed a natural group characterised by short narrow leaves and rose-coloured flowers, and that certain specimens from north-west Yunnan which had immaculate or very finely spotted white flowers were also alike in other respects, namely short stature and short relatively broad leaves. This material is the *L. yunnanense*, while the east Yunnan-Kweichow specimens are the *L. linceorum*.

L. bakerianum, in the broad sense, consists, in fact, of five varieties, recognised easily by flower-colour, but having vegetative characteristics as well, and occupying well-defined homogeneous areas of distribution, as set out below.

Lilium bakerianum *Collett & Hemsley* in Journ. Linn. Soc. London, Bot. **28,** 138 (1890) var. **typicum** Stearn in Gard. Chron. ser. 3, **124,** 4 (1948) ; 60–120 cm. altum foliis 5–7·5 cm. longis et 3–5 mm. latis (interdum 7–12 mm. latis), sed plantae debilia 27–30 cm. altae foliis 3–3·7 cm. longis et 3–5 mm. latis, floribus 1–4 ; perigonium 6·5–11 mm.

(in hortis usque ad 13 cm.) longum, album intus a basi purpureo suffusum et supra maculatum vel omnino plus minus intense purpureo-maculatum. Syn. *L. lowii* Baker in Bot. Mag. t. 7232 (1892).

Southern Shan States : Taunggyi (20° 48′ N., 97° E.), *W. A. Robertson* 339 ; prope Koni (circiter 30 km. SW. Taunggyi), *H. Collett* 834 (typus).

China—S. Yunnan : Szemao, *A. Henry* 13026 ; Mengtze, *W. Hancock* 214.

A tall plant with relatively long narrow leaves, and perigone exceeding that of the other varieties in size. It differs from other members of the species in its white flowers either heavily suffused with purple or maroon in the lower part and blotched upwards or more or less heavily blotched throughout. The type-locality is the most southerly record for the species and is remote from the other two stations for var. *typicum*. The variety is in the subtropical or warm temperate zone in latitudes 20° 48′–23° 20′ N., and is isolated from all the other varieties except var. *rubrum*, whose range it overlaps at Mengtze.

L. bakerianum var. **rubrum** *Stearn*, l.c. ; 20–60 cm. rare ad 80 cm. altum foliis 2·5–6 cm. longis plerumque 2–5 mm. interdum ad 7 mm. latis, floribus plerumque 1 interdum 2 vel in plantis robustissimis 3–4 ; perigonium 5–8 cm. longum, roseum vel obscure purpureum, intus fusco-purpureo maculatum et suffusum.

Syn. *L. linceorum* Léveillé et Vaniot in Mem. Pont. Accad. Rom. Nuov. Lincei, **23,** 371, t. 2 (1905), reimpr. Lil. Amaryll. Irid. Hemod. Chine, 43, t. 2 (1905).

China—E. Yunnan : Peta, route de Tchen fong—Shiu guj fou, *Esquirol* 3135 ; Pe-long-tsin, *Maire* ; Siao-ou-long, *Maire* ; Lan-ngi-tsin, *Maire* ; ibid. *Ducloux* 2665 ; Tong-tchouan [Tungchwan], *Maire* (Juin et Juillet) ; ibid. (" Tchong-Chan ") *Ducloux* 437 ; mountains N. of Yunnanfu, *Schoch* 214 ; Yunnanfu area, *Ducloux* 479, *Maire* 2239, 2654, *Maire anno* 1912 ; Mengtze, *Hancock* 309, 568 ; ibid. *A. Henry* 10774, 10774A, 10774B ; Lao-kouy-chan, *Vigueou* 430 ; Beling chan, *Handel-Mazzetti* 10148.

Kweichow : Ganpin, *Martin & Bodinier* 1681 ; Gan-chouan, *Cavalarie* 3925.

Recognised from all the other varieties by the ground-colour of the flowers being pink or rose. It also has a distinct geographical distribution, being confined to eastern Yunnan and Kweichow, though, as noted above, var. *typicum* has also been found at Mengtze. Commonly a single-flowered plant less than 60 cm. high with rather short narrow leaves, it is generally shorter and has shorter leaves than var. *typicum*. It is comparable in size with var. *yunnanense*, but the leaves are generally narrower.

Lilium bakerianum var. **delavayi** (*Franchet*) *E. H. Wilson*, Lilies of Eastern Asia, 43 (1925) ; 45–150 cm. altum, foliis 2·5–3·5 cm. longis et 2–8 mm. latis usque ad 5–7·5–(8) cm. longis et 5–9–(12) mm. latis, floribus 1–2 raro 3–4 ; perigonium 6·5–8 cm. longum (rarissime usque

9 cm. longum ut in *Forrest* 5824 in herbario Edinensi), viridi-luteum plus minus intense purpureo-maculatum vel purpureo-rubro inferne suffusum et superne maculatum.

Syn. *L. delavayi* Franchet in Journ. de Bot. **6,** 314 (1892).

China—N.W. Yunnan : W. of Tengyueh, 25°N., *Forrest* 8499 ; Shweli-Salwin divide, 25° 45′ N., *Forrest* 25105 ; eastern flank of the Tali range, 25° 40′ N., *Forrest* 1894, 7137, 27994 ; Tali, *Forrest* 30141 ; above Lan Kong lake, *Delavay* 4310 ; [Kou-toui, *Delavay* ; Yang in chan, *Delavay* 4309 ; Houang-li-pin above Tapintze, *Delavay* 3576 ;—all *fide* Franchet, l.c. The localities are in the mountains north of the Tali Lake (Erh Hai) about 26° 8′ N., from Lankong in the west to Tapintze in the east.] ; Lao-chun shan, S.W. of Shiku, 26° 40′ N., *Rock* 25127, 25129 ; Yun-lu shan, *Rock* 25048 ; N. of Yungpeh, *Forrest* 22061 ; Lichiang mountains, 26° 50′–27° 35′ N., *Forrest* 2433, 5824, 10317, 30174, 30177, *Rock* 4756, 7402, 24934, 24935, *Schneider* 1840 ; ibidem ? –Chuisa shan, *Forrest* 30166, 30167 ; Labo shan, *Forrest* 30181 ; sine loc. *Forrest* 28581, 28747 ; sine loc. *McLaren's Collectors* B. 137, B. 138, L. 64, N. 91 ; Yungning, *McLaren's Collector* N. 20 ; ibidem (" Yungling "), *Forrest* 30160 ; Mt. Wuaha, Yungning Territory, *Rock* 24230, 24232.

S.W. Szechuan : S.E. of Yungning, 27° 40′ N., *Forrest* 21448 ; descent to Shiu lu, *F. K. Ward* 4245 ; watershed of Shou-chu river, *Rock* 16268 ; between Yenyuan hsien and Kuapie, *Schneider* 1485.

A variable plant characterised by the flowers having a greenish-yellow ground colour heavily blotched with purplish-red, or the purplish colour suffusing the lower part of the perigone. Geographically it is completely set apart from var. *typicum* and var. *rubrum*.

Lilium bakerianum var. **aureum** *Grove & Cotton* in R.H.S. Lily Year Book, **8,** 127 (1939) et Suppl. Elwes' Monogr. Gen. Lilium, 114–5, t. 26 (1940) ; 45–100 cm. altum, foliis 6·5–11 cm. longis et 6–11 mm. latis, floribus 1–3 ; perigonium (5)–6·5–8 cm. longum, intense aureum (secundum Forrestium) vel viridi-flavum, delicate brunneo-purpureo-maculatum.

China—N.W.Yunnan : mountains between the Yangtze and Mekong rivers, west of Chienchuan, 99° 20′–99° 42′ E. and about 26° 30′–26° 40′ N., *Forrest* 21578, 22210, 23548 ; " Lao Ching Shan " [? Lao Chun Shan, 26° 40′ N.], *Forrest* 30172 (?).

Characterised by its long, relatively wide leaves, and yellow finely spotted flowers. In both characters it contrasts with the other yellow-flowered variety, var. *delavayi*. Its localities are within the range of var. *delavayi*, but the specimens are easily distinguished.

Lilium bakerianum var. **yunnanense** (*Franchet*) *Sealy*, **var. nov.** ; 18–50 cm. altum, foliis 2·5–4·5 cm. longis et 7–13 mm. latis usque ad 3–5·5 cm. longis et 4–6 mm. latis, floribus 1–2 [in una planta (*Forrest* 16934) caulis 3-floris] ; perigonium 4–8 cm. longum, album vel extus pallidissime roseo suffusum, immaculatum vel intus a basi per duas tertias partes delicate purpureo-maculatum.
Syn. *L. yunnanense* Franchet in Journ. de Bot. **6,** 314 (1892).

China—N.W. Yunnan : around Tapintze, *Delavay* 1837, 2737, 3577 ; western slopes of Sungkwei Range, 100° 12′ E., 26° 18′ N., *Forrest* 23052 ; near Yungpeh, *Handel-Mazzetti* 3381 ; ibidem, *Siméon Tén* 276 ; mountains N. of Yungpeh, 26° 50′ N., *Forrest* 22087 ; between Likiang, Yungning, and Yungpeh, *Rock* 5181 ; mountains in the N.E. of the Yangtze bend, 27° 40′ N., *Forrest* 10545 ; ibidem, 27° 45′ N., *Forrest* 11325 ; Fengkow, *Forrest* 30180 ; Yangtze valley N. of Fengkow, 27° 42′ N., *Forrest* 20666 ; Yangtze gorge (apex of loop), *F. K. Ward* 5281 ; gorge of the Shiu-lu, *F. K. Ward* 4294 ; Kari pass, Mekong-Yangtze divide, 27° 40′ N., *Forrest* 12977 ; sine loc. *McLaren's Collector* B. 167.

This is a relatively dwarf plant, resembling in this respect var. *rubrum*, with short and relatively broad leaves. It is also characterised by its flowers being pure white, or faintly flushed with rose outside, immaculate or finely spotted. The white-flowered var. *typicum* has the flowers heavily blotched and is a much bigger plant in every way. The finely spotted var. *aureum* not only differs by its yellow ground colour but also by its greater size.

A much taller plant has been collected further north in Sikang, on Dzampe Sheren Mt. west of Wuato Gomba by Rock (23756) and near Tachienlu by Wilson (*Veitch Exped.* 4692, *Arn. Arb. Exped.* 1450). This has stems from 65 cm. long with leaves 3 -3·5 cm. long and 3 -4 mm. wide, to over 125 cm. long with leaves 6–8 cm. long and 3–5 mm. wide. The flowers, 2 in number and about 7 cm. long in all the specimens seen, are white (*Rock* 23756) or white finely spotted with maroon (?), though the spots are larger and heavier in the Kew sheet of Wilson's 1450 than in the Edinburgh sheet of the same number. These specimens stand between var. *yunnanense*, with which they agree in the flowers, and var. *typicum*, which they much resemble in stature and size of leaves. Geographically they are near to the former, though located farther north, but very remote from the latter.

Lilium euxanthum (*W. W. Sm. & W. E. Evans*) *Sealy*, **comb. nov.**
Syn. *Nomocharis euxantha* W. W. Sm. & W. E. Evans in Notes Roy. Bot. Gard. Edinb. **15,** 14–16 (1925) 192 (1926).

Lilium georgei (*W. E. Evans*) *Sealy*, **comb. nov.**
Syn. *Nomocharis georgei* W. E. Evans in Notes Roy. Bot. Gard. Edinb. **15,** 193–4, t. 218 (1926).

Lilium henrici.

When dealing with this species—which he included in *Nomocharis*—Mr. W. E. Evans pointed out that the material referred to it could be divided into two groups, which he designated as f. *typica* and f. *maculata* (Notes Roy. Bot. Gard. Edinb. **15,** 194–5 : 1926). The f. *typica* was characterised by the perigone being white or very faintly flushed with pink, by the outer tepals deeply saccate or gibbous at the base, and by the inner tepals with a broad deep crimson blotch covering the base ; while f. *maculata* differed in having the perigone more or less deeply flushed with rose-purple, in the outer tepals being curved or only very slightly saccate at the base, and in the inner tepals having only a small crimson botch at the base, with a few crimson spots above it.

Examination of the herbarium material reveals other differences, as follows. The bulb is deep purplish in f. *typica*, but smaller and yellow in f. *maculata* ; the plants are bigger in f. *typica* (stem 75–182 cm. long against 30–67 cm.) and have the flowers much more laxly arranged, being distributed through 10–19 cm. of stem (against crowded in up to 6·5 cm. of stem in f. *maculata*), and borne on longer pedicels (3·5–8·5 cm. long against 1·5–4 cm.) ; while finally the styles in f. *typica* are 2·5–3 cm. long against 1·7–2·1 cm. in f. *maculata*. It must be noted that in his field-notes Forrest recorded f. *maculata* as up to 2½–3 ft., i.e. 75–90 cm., but no material of these dimensions has been seen—the largest example having stems 67 cm. in length (from top of the bulb). It is possible that f. *maculata* may represent a distinct species, but until more is known about it, it may well remain in *L. henrici*, though varietal rank seems more appropriate than that of a form. Details of the two varieties of *L. henrici* are given below.

L. henrici *Franchet* in Journ. de Bot. **12,** 220 (1898) var. **typicum** (*Evans*) *W. T. Stearn* in Woodcock & Stearn, Lilies of the World, 226 (1950)*. Bulbi usque 5 cm. alti et 6 cm. diametro, squamis intense purpureis ; caules 75–182 cm. alti (ad apicem bulbi) ; folia in plantis minoribus 5–7·5 cm. longa et 4–7 mm. lata, in plantis majoribus plerumque 9–14 cm. longa et 6–11 mm. lata ; flores in plantis minoribus 2 approximati pedicellis 3–4·5 cm. longis, in plantis majoribus 4–8 valde separati (in caule per 10–19 cm. dispositi) pedicellis horizontalibus 3·5–8·5 cm. longis ; perigonium campanulatum vel cupulare, album vel leviter roseo-tinctum ; tepala exteriora basi valde saccata vel gibbosa et intus macula intense rubra medio viridi-sulcata ornata ; tepala interiora intus basi per 8 mm. valde intense rubra medio viridi-sulcata ; stylus 2·5–3 cm. longus. Fig. 2, J-M.

Syn. *Lilium franchetianum* Léveillé, Liliographia, 7 (1919).)
Nomocharis henrici (Franchet) E. H. Wilson, Lilies E. Asia, 13 (1925) ; W. E. Evans in Notes Roy. Bot. Gard. Edinb. **15,** 38–40, t. 209, 212b (1925), pro parte.
Nomocharis henrici forma *typica* W. E. Evans, l.c. 194–5 (1926).

China. N.W. Yunnan : gauche du Mekong vers Lou Kou [Luku], *Henri d'Orleans* (type) ; Mekong–Salwin divide, 26° 10′ N., *Forrest* 18282 ; ibid. 26° 30′ N., *Forrest* 18250 ; Chintsi Shan, west of Wei Hsi, 27° 12′ N., 99° 12′ E., *Forrest* 30158 ; Laktang, *F. Kingdon Ward* 3261 ; sine loc. *McLaren's Collector* D. 188.

L. henrici var. **maculatum** (*Evans*) *W. T. Stearn* l.c. Bulbi 2·5 -3·5 cm. alti et 3–4 cm. diametro, squamis flavis ; caules 30–67 cm. longi (ad apicem bulbi) ; folia in plantis minoribus 5–7 cm. longa et 4 -8 mm. lata, in plantis majoribus plerumque 6–11 cm. longa et 7–13 mm. interdum usque 16 mm. lata ; flores in plantis minoribus 1–2, in plantis majoribus 2–6, approximati interdum subverticillati (in caule per longitudine

*After the present account had been prepared, Mr. Stearn told me that he too had come to the conclusion that f. *typica* and f. *maculata* should be given varietal rank, and had made the necessary combinations.

usque 6·5 cm. conferti), pedicellis ascendentibus vel patulis (1·5)–2–4 cm. rarissime 5·5 cm. longis ; perigonium cupulare album plus minus roseo tinctum ; tepala exteriora basi curvata (vix saccata vel canaliculata) intus macula rubra parva ornata ; tepala interiora basi intus leviter sulcata et macula rubra usque 5 mm. alta et maculis minutis paucis rubris ornata ; stylus 1·7–2·1 cm. longus. Fig. 2, F-I.
Syn. *Nomocharis henrici* (Franchet) E. H. Wilson ; W. E. Evans in Notes Roy. Bot. Gard. Edinb. **15,** 38–40 (1925) pro parte.

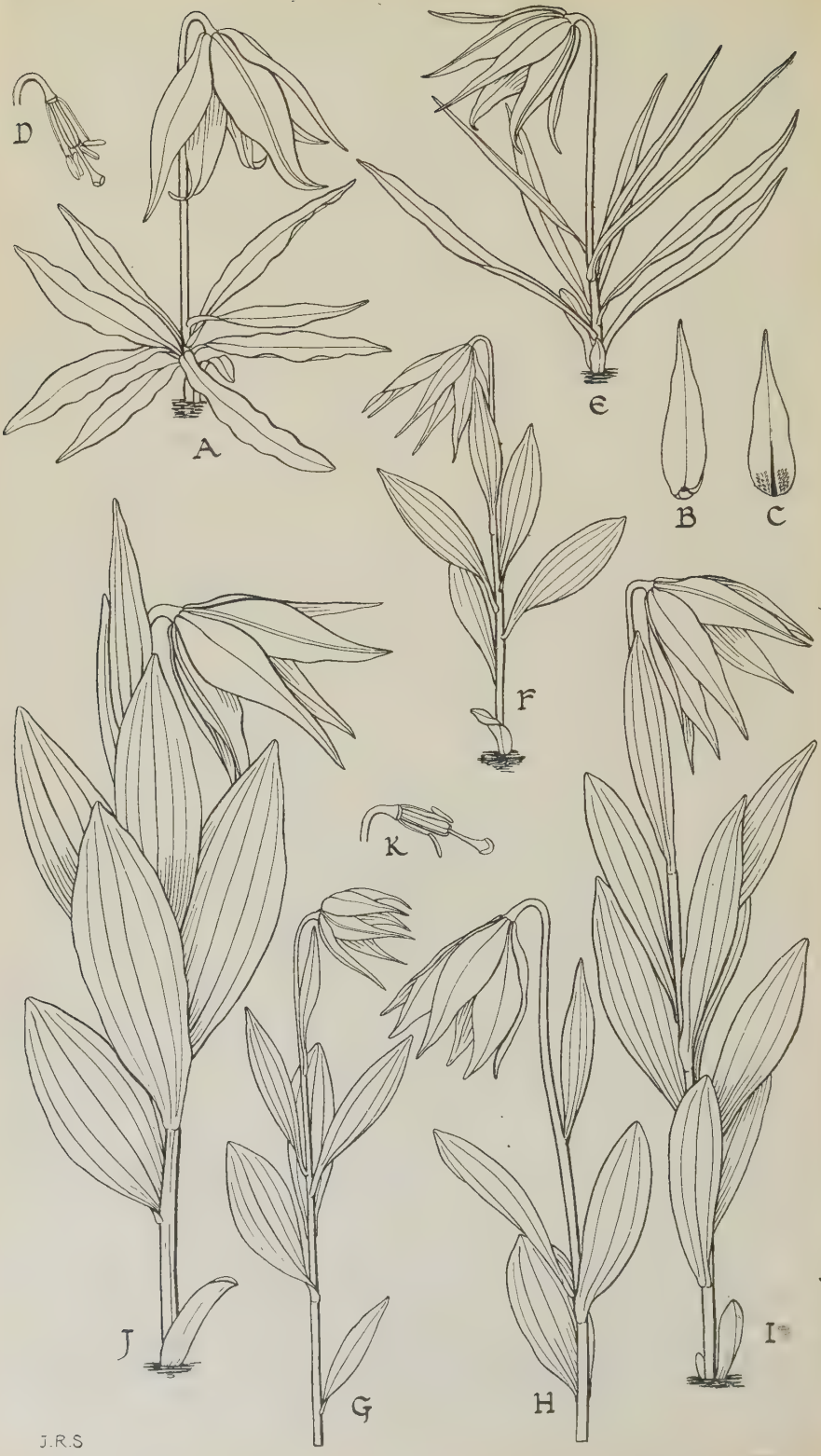
Nomocharis henrici forma *maculata* W. E. Evans in Notes Roy. Bot. Gard. Edinb. **15,** 194–5 (1926).

China—N.W. Yunnan : Shweli-Salwin divide, 25° 20′ N., *Forrest* 12024, 9024 (?—in fruit), 15827 ; ibid. 25° 25′ N., *Forrest* 17487 ; ibid. 25° 30′ N., *Forrest* 17590 ; ibid. 25° 50′ N., *Forrest* 24788, 26780 ; Mekong-Salwin divide, 26° 30′ N., *Forrest* 18208 ; sine loc. *Forrest* 29942.

Lilium lophophorum.

This charming and graceful species, outstanding on account of its nodding flowers with lanceolate long-acuminate segments (which sometimes remain coherent at the apices so that the flower has the appearance of a small Chinese lantern), is very variable. It was originally described from specimens collected in Sikang, and most of the material from that province and from the adjacent parts of Szechuan and Yunnan holds together very well. The plants (fig. 5, A) are small, about 7–13·5 cm. high above ground, and have 6–9–(10) spreading or ascending leaves crowded and rosulate on the 1–2·5 cm. of the stem immediately above ground, the stem being continued upwards as a naked pedicel 6–12 cm. long bearing a single nodding flower, or, rarely, there may be twin pedicels each carrying a flower ; the leaves are elliptic-oblong, acute, mostly 4–7 cm. long and 4–12 mm. wide, and undulate ; the flowers may be yellow and sparsely finely red-spotted inside (usually in the lowermost third only), or yellow and emaculate, or purplish. An exceptionally robust example is *Pratt* 568 from Tachienlu (figured in Hooker's Icones Plantarum t. 2219) with leaves 8–11·5 cm. long and 1·5–2·3 cm. wide spread over 7 cm. of stem, and with twin pedicels 13 cm. long ; while Soulié's 326 from Tongolo and Wilson's 4689a from Tachienlu include notably etiolated plants with leaves 9–15 cm. long and 7–15 mm. wide, spaced along 10·5–18·5 cm. of stem, and with pedicels about 15 cm. long. Agreeing with typical plants except that the leaves are shorter and broader (3–5 cm. long and 7–15 mm. wide) and tend to be more obtuse, is Forrest's 23074, collected in Yunnan on the Chienchuan-Mekong divide, 26° 36′ N., and the southernmost record for the species.

In certain specimens from N.W. Yunnan (*Kingdon Ward* 157) and S.W. Szechuan (*Rock* 23870, *Schneider* 1512) the leaves tend to be shorter and broader (4–6·5 cm. long and 8–16 mm. wide), apparently more or less erect, and scattered through (3·5)–5–10 cm. of stem ; the pedicel varies from twice as long as to a little shorter than the leafy part of the stem, but in one specimen of K.W. 711 the pedicel is much shorter (4·5 cm. long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against 10 cm. for leafy part) and in one plant of Rock's 23870 it is little more than half as long (3·5 cm. against 6·5 cm.) and the uppermost leaf overtops the flower.

These specimens (see fig. 5, F, G) with short pedicels and broader, more scattered, erect leaves resemble plants from the Lichiang area of N.W. Yunnan which commonly have the leafy part of the stem twice to four times as long as the pedicel, though sometimes subequal to less than twice as long. Moreover the leaves are broader than those of the typical form of the species (5·5–10 cm. long and 8–28 mm. wide against 4–7 cm. by 4–12 mm.), erect or ascending and frequently overtopping the flower ; they occupy from 5 cm. to 17 cm. of stem, while the pedicel ranges from 3 to 8 cm. in length and from a trifle longer than the leafy part (6 cm. against 5·5 cm.) to one quarter as long (3 cm. against 12 cm.). In extreme cases these Lichiang plants appear so different from the typical form of the species that a distinguishing epithet is desirable, and they have been designated below as forma *latifolium* (fig. 5, H-J).

From extreme N.W. Yunnan near the Tibet border, 27° 30′–28° 30′ N. have come plants which resemble typical *L. lophophorum* in having the leaves crowded in a rosette in the basal 1–2 cm. of stem, or spaced over 5 cm. with the pedicel at least twice as long as the leafy part, but which differ in having longer and much narrower leaves, 6–10 cm. long and 2–8 mm. wide (against 4–7 cm. by 4–12 mm.). This is *Nomocharis wardii* of Balfour f. (fig. 5, E). The flowers may be yellow and emaculate, yellow spotted red inside, or purplish—all three being represented in the type-collecting, *Kingdon Ward* 813—and the inner segments are very weakly crested, there being very few fimbriae on either side of the nectarial channel. In two of the localities (Atuntze and Doker-la) where he collected the narrow-leaved plants, Kingdon Ward also found plants with broader, more scattered leaves, which may represent weak examples of f. *latifolium.* The narrow-leaved plants seem best regarded as a form of the species, and may be conveniently named f. *wardii.* Finally there are specimens collected in Yunnan by Forrest (30170) and Rock (25057, 25158) which agree with *L. lophophorum* in shape of flower, but which differ strikingly by the (yellow) flower being conspicuously red-spotted, and by the much narrower, more numerous (15–16 against 4–9), linear leaves, which are 4·5–9·5 cm. long, 5–2 mm. wide, and clothe the stem throughout its length (fig. 4, P, Q). Except for the heavy spotting the flowers agree with those of *L. lophophorum*, and therefore, despite the very great difference in general appearance, it seems better to regard this linear-leaved plant as a subspecies of that species, rather than as a distinct species. A synopsis of the material referred to *L. lophophorum* and its subspecies and forms follows.

FIG. 5. *Lilium lophophorum* subsp. *typicum* ; **A–D,** *Wilson V. E.* 4369. **A** plant. **B** outer tepal. **C** inner tepal, **D** gynoecium and four stamens ; **E** plant of f. *Wardii* (*K. Ward* 813 ; **F–K,** f. *latifolium*. **F** & **G** plants of *K. Ward* 711. **H** *Rock* 24877. **I–K** *Forrest* 2390. **I** & **J** plants, **K** gynoecium and two stamens ; all figures one-half natural size. All drawn from herbarium specimens.

Lilium lophophorum (*Bur. & Fr.*) *Franchet* in Journ. de Bot. **12,** 221 (1898) ; Wilson, Lilies E. Asia, 104 (1925) ; subsp. **typicum** *Sealy*, **subsp. nov.** Fig. 5, A-D.

Syn. *Fritillaria lophophora* Bureau et Franchet in Journ. de Bot. **5,** 153 (1891).

Nomocharis lophophora (Bur. & Fr.) W. E. Evans in Notes Roy. Bot. Gard. Edinb. **15,** 11–14 (1925).

Sikang : between Batang and Litang, *Bonvalot et d'Orleans* (fide Bureau et Franchet) ; Tachienlu, *Soulié* 989 ; ibidem, *Pratt* 261, 568 ; ibidem, *E. H. Wilson Veitch Exp.* 4689, 4689a, *Arn. Arb. Exp.* 1456 ; Tongolo, *Soulié* 326, 725 ; Baurong to Tachienlu via Hadjaha, *Stevens* 412 ; Muli Mts. 28° 12′ N., *Forrest* 16664 ; Dzampe sheren Mt., west of Wuato Gomba, E. Muli, *Rock* 23743, 24342 ; Litang R. divide, S.W. of Muli, *Kingdon Ward* 4074.

S.W. Szechuan : Mt. Siga, N.E. of Kulu, *Rock* 17922, 24377.

N.W. Yunnan : Mts. of Chungtien Plateau, 27° 55′ N., *Forrest* 10624 ; Chienchuan-Mekong divide, 26° 36′ N., 99° 40′ E., *Forrest* 23074 ; sine loc. *Forrest* 28739.

L. lophophorum subsp. **typicum** forma **latifolium** *Sealy*, **forma nova** foliis in caulem per 5–17 cm. dispersis erecto-ascendentibus 4–10 cm. longis et 8–28 mm. latis, pedicello quam caule foliato plerumque magis breviore sed interdum subaequali raro duplo longiore recognoscenda. Fig. 5, F-K.

S.W. Szechuan : Mt. Siga, west and overlooking the Yalung River N. of Karadi, *Rock* 23870 ; between Hunka and Woloho, *Schneider* 1512.

N.W. Yunnan : Atuntze, *Kingdon Ward* 157 ; Doker-la, *Kingdon Ward* 711 ; eastern flank of the Lichiang Range, 27° 16′ N., *Forrest* 2390 (typus) ; ibidem, 27° 30′ N., *Forrest* 6156 ; eastern slopes of the Lichiang snow range (Yu-lung shan), Mt. Satseto, *Rock* 24877 ; Yun-lu shan, S.W. of Lichiang snow range, *Rock* 25050.

L. lophophorum subsp. **typicum** forma **wardii** (*Balf. f.*) *Sealy* **forma nova** foliis anguste loratis vel linearibus 6–10 cm. longis et 2–8 mm. latis distincta. Fig. 5, E.

Syn. *Nomocharis wardii* Balf. f. in Trans. Bot. Soc. Edinb. **27,** 297 (1918).

N. lophophora var. *wardii* (Balf. f.) W. W. Sm. & W. E. Evans in Notes Roy. Bot. Gard. Edinb. **14,** 120 (1925) ; W. E. Evans, ibid. **15,** 12 (1925).

N.W. Yunnan : Ka-gwr-pw, *Kingdon Ward* 813 (typus) ; Atuntze, *Kingdon Ward* 156 ; Doker-la, *Kingdon Ward* 741 ; Mekong-Salwin divide, 28° 12′ N., *Forrest* 14109 ; ibidem, 27° 36′ N., *Forrest* 19846.

L. lophophorum subsp. **linearifolium** *Sealy*, **subsp. nov.** ; subspecies caule dense folioso, foliis 15–16 erectis linearibus flore flavo conspicue purpureo-maculato excedentibus insignis. *Bulbus* anguste ovoideus, 3–4 cm. longus, circiter 1·7–2 cm. diametro ; squamae numerosae, imbricatae, carnosae, ovatae et longe acuminatae (exteriores) vel lanceolatae, 3·7–2·8 cm. longae, 12–8 mm. latae. *Caulis* (a bulbo ad florem) 14·5–30 cm. longus, glaber, cataphyllis 2–4 oblongis obtusis

2·5–3·5 cm. longis 3–8 mm. latis exceptus supra basin per 6·5–13 cm. nudus, deinde dense foliosus foliis 15–16 erectis vestitus. *Folia* linearia, ad apicem sensim attenuata, 4·5–9·5 cm. longa, 5–2 mm. lata, supra saturate viridia, subtus pallidiora, glabra. *Flos* solitarius, horizontalis vel cernuus, pedicello 1·5–5 cm. longo. *Perigonium* campanulatum vel segmentis ad apicem coherentibus, 4–5 cm. longum, flavum intus purpureo-maculatum ; segmenta subaequalia, lanceolata vel anguste ovata in apicem longe acuminatum sensim attenuata, 4–5 cm. longa, 1–1·5 cm. lata ; segmenta exteriora ad basin leviter saccata brevissime canaliculata et purpurea ; segmenta interiora basi rotundata marginibus per 1 cm. erosulatis, intus a basi per 1 cm. purpureo-canaliculata utrinque per 5 mm. dense cristata. *Stamina* 2–2·3 cm. longa ; filamentis linearibus, 1·5–1·7 cm. longis ; antheris 7–8 mm. longis, dorsifixis, versatilibus, supra basin 2·5–3 mm. affixis. *Gynoecium* 1·8–2·5 cm. longum, ovario cylindrico 9–14 mm. longo, stylo superne sensim incrassato cum stigmate 9–11 mm. longo, stigmate 3 mm. diametro. Fig. 4, P-Q.

N.W. YUNNAN : Chintsi Shan, west of Wei-Hsi, 27° 12′ N., 99° 12′ E., *Forrest* 30170 ; Kin-tzu shan or Dsho-yu nolu, district of Labako, west of Shi-ku, *Rock* 25158 (typus) ; Yun-lu shan, S.W. of Lichiang snow range, *Rock* 25057.

Alpine meadows 10500–13000 ft.

Lilium sempervivoideum.

The confusion with this species (fig. 3, F-I) of another, distinct, species, *L. amoenum* Sealy (fig. 3, B-E) has been discussed in the Botanical Magazine, N. Ser. t. 73, where *L. amoenum* is figured. As Léveillé's description of his *L. sempervivoideum* (in Bull. Géogr. Bot. **25,** 38 : 1915), is extremely brief, and as later descriptions under that name refer either wholly or in part to *L. amoenum*, it seems useful to give the following new description of Léveillé's plants.

Bulbus 2·5–4 cm. longus, 2·5–3·5 cm. latus ; squamae multae, lanceolatae, 2·3–2·9 cm. longae et 7–10 mm. latae usque ad 2·7–4·3 cm. longae et 8–12 mm. latae, imbricatae, carnosae. *Caulis* 20–45 cm. longus (ab apice bulbi usque ad basin floris), superne glaber, inferne asperulus, infimus radices emittens, a basi per 5–9 cm. cataphyllos 3–5 remotos membraneos vel suprema herbaceos ornatus, deinde foliis 20–40 (vel plures) linearibus ascendentibus confertissimis vestitus, floribus 1 raro 2 rarissime 3 patentibus vel cernuis terminatus. *Folia* linearia, obtusa, 2–6·5 cm. longa, 1·5–2·5 mm. lata (infima interdum usque 4 mm. lata), marginibus revolutis (in sicco), 1-nervis, supra intense viridia, subtus pallidiora. *Perigonium* infundibuliforma-campanulatum, 3–4 cm. longum, album, in dimidio infero dense et delicate rubro-maculatum ; segmenta exteriora anguste elliptica vel oblongo-elliptica vel lanceolata, apice obtusissima et dense papillosa, 3–4 cm. longa, 6–9 mm. lata, a basi canaliculo angustissimo viride (?) 7 mm. longo ornata ; segmenta interiora elliptica vel late elliptica vel ovata, ad apicem obtuse acuta vel rotundata et dense papillosa, 3–4·3 cm. longa, 1–1·5 cm. lata, a basi canaliculo viridi (?) usque 10 mm. longo ornata. *Stamina* filamentis gracilissimis 1·4–1·6 cm. longis ; antherae 6–8 mm. longae, dorsifixae, versatiles, ad filamentos 2–2·5 mm.

supra basin affixae, flavae (?) ; pollen flavum. *Ovarium* 8–10 mm. longum, viride ; stylus et stigma 1·5–2·2 cm. longi, stylus superne sensim incrassatus, stigma circita 3 mm. lata.

China—E. Yunnan : Siao-ou-long, *E. E. Maire* (Junio sine anno in herb. Leveilleo=herb. Edin. 57/1913 ; Julio sine anno in herb. Leveilleo =herb. Edin. 117/1913 ; Junio sine anno in herb. Leveilleo=herb. Edin. 2/1914).

Lilium souliei (*Franchet*) *Sealy*, **comb. nov.**

Syn. *Fritillaria souliei* Franchet in Journ. de Bot. **12,** 221 (1898)

Nomocharis souliei (Franchet) W. W. Sm. et W. E. Evans in Notes Roy. Bot. Gard. Edinb. **14,** 102 (1925) ; W. E. Evans, ibid. **15,** 40–43, t. 210 (1925), 197 (1926).

Nomocharis synaptica *Sealy*, **sp. nov.,** inter congeneros filamentis versus apicem sensim attenuatis in aristam flavam abrupte contractis, et tepalis interioribus in basin cristas longitudinales carnosas laeves instructis insignis.

Syn. *N. aperta* (Franch.) E. H. Wils. sec. Ward, Plant Hunting on the Edge of the World, 247, 271, 344, 373 (1930), *non* (Franch.) E. H. Wils.

Bulbus ovoideus, circiter 3 cm. altus et 2·5 cm. diametro ; squamae numerosae, erectae, imbricatae, carnosae, lanceolatae vel ovatae, 3 cm. longae et 8–15 mm. latae, sed interiores minores et intimae oblongae 1·5 cm. longae et 5 mm. latae ; radices crassae, carnosae, contractiles. *Caulis* 40–45 cm. altus vel 75–105 cm. altus *fide* Kingdon Ward, glaber, in dimideum inferiorem vel in partem tertiam infimam cataphyllis paucis valde remotis ornatus, ceterus foliosus, sub apice 2–3-florus, foliis 4 vel 6 terminatus. *Folia* anguste elliptica, longe acuta vel acuminata, basi cuneata, in plantis minoribus 4·5–5 cm. longa et 7–10 mm. lata, in plantis robustis 5·5–6.8 cm. longa et 1·2–1·7 cm. lata, floralia latissima, marginibus minute scabridulis, supra saturate virides, subtus pallidiora, ad basin utrinque villis instructa cetera glabra, costa et nervis lateralis uno vel duis utrinque nonnihil prominentibus. *Flores* in axillari folium solitarii cum folia una angusta ad basin pedicelli ; pedicellus 3·5–6·5 cm. longus, patens. *Perigonium* late expansum et breve concavum, circiter 7–7·5 cm. (10 cm. *fide* Kingdon Ward) diametro, album vel purpureo-roseo suffusum et irregulariter atropurpureo-maculatum ; tepala exteriora oblonga, acuta, basi rotundata, 4–4·2 cm. longa, circiter 1·5 cm. lata, ad basin macula intense atropurpurea circiter 3 mm. longa et 2 mm. lata cum macula flava minora instructa ; tepala interiora oblongo-ovalia, acuta, basi rotundata, 4–4·2 cm. longa, circiter 2 cm. lata, ad basin per 5 mm. longum et 8 mm. latum intense atropurpurea flavo-marginata in medio anguste canaliculata utrinque cum cristis laevibus carnosus flavo-praefixis instructa. *Stamina* 13–15 mm. longa ; filamenti 10–12 mm. longi, paulum carnosi, leviter compressi, a basi versus apicem sensim attenuati, atropurpurei, in aristam flavam 2 mm. longam abrupte contracti ; antherae 4 mm. longae, dorsifixae, supra basin circiter 1–2 mm. affixae, versitales ; pollen ferrugineum. *Gynoecium* viride ; ovarium 8–10 mm. longum, stylo subaeqalium. Fig. 1, H-K.

ASSAM. Delei Valley, 28° 21′ N., 96° 37′ E., alt. 10000–12000 ped., 9/vii/1928, *F. Kingdon Ward* 8399 (typus in herb. Kew.).

The colours mentioned above are taken from the collector's notes, in which the habitat is described as follows :

" It grows on either side of the ridge, on earth slopes amongst loam and granite chips well out in the open where it can get the sun (when there is any) but amongst a host of other plants such as Rodgersia, Roscoea, etc. Not very abundant, two or three dozen plants seen, on one cliff only, where the Irises and Cypripediums grow ".

This species is a most interesting discovery inasmuch as it forms a perfect link between the typical *Nomocharis* species (*N. pardanthina*, *N. meleagrina*, *N. mairei*, *N. basilissa*, and *N. farreri*), which have the base of the inner tepals with low crests, and stamens with a fleshy cylindrical filament bearing a needle-like awn at the top, and the two other species, *N. aperta* and *N. saluenensis*, which have the inner tepals with swellings instead of crests at the base, and filaments gradually attenuated towards the apex and then suddenly contracted into an awn. *N. synaptica* combines the typical *Nomocharis* tepals with stamens of the other two species, and thus, as its name implies, links them together. The collector mistook it for *N. aperta*. In his published account (l.c. p. 271) he described the perigone as " heavily blotched with purplish crimson on a white or flushed satin ground ", while his field-label reads " perianth lobes suffused with purplish pink, and unevenly spotted all over with irregularly shaped dark purple blotches ".

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